Exhibit 1

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UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

GREAT AMERICAN TOOL COMPANY, INC. a New York Corporation, *Plaintiff,* v. COLUMBIA RIVER KNIFE AND TOOL CO., an Oregon Corporation, *Defendant.*	Civil Action No.: 07CV2905(KMK) **FIRST AMENDED COMPLAINT** **JURY TRIAL DEMANDED** **ECF CASE**

FIRST AMENDED COMPLAINT

Plaintiff Great American Tool Company, Inc. ("GATCO") complains against Defendant Columbia River Knife and Tool Co. ("CRKT") as follows:

NATURE OF THIS ACTION

1. Plaintiff Great American Tool Company, Inc. brings this action for patent infringement and for a declaratory judgment of non-infringement and invalidity under the Patent Laws of the United States, 35 U.S.C. § 101 *et seq.*

JURISDICTION AND VENUE

2. This is an action for patent infringement arising under the patent laws of the United States (Title 35 of the United States Code) and the Declaratory Judgment Act, 28 U.S.C §§ 2201 and 2202. This Court has subject matter jurisdiction of this action pursuant to 28 U.S.C. §§ 1331 and 1338(a).

3. This Court has personal jurisdiction over Defendant CRKT pursuant to CPLR § 302(a) of the New York State Long-Arm Statute and the U.S. Constitution because Defendant is contracting to supply goods in the State of New York and within this judicial district, and otherwise purposefully avails itself of the benefits of this judicial district.

4. Venue is proper in this district pursuant to 28 U.S.C. §§ 1391(b-c) and 1400(b).

THE PARTIES

5. Plaintiff GATCO is a corporation duly organized and existing under the laws of the State of New York with its principal place of business at 665 Hertel Avenue, Buffalo, New York 14207.

6. Upon information and belief, Defendant CRKT is a corporation organized and existing under the laws of Oregon, having a place of business at 9720 S.W. Hillman Court, Suite 805, Wilsonville, OR 97070.

FACTS COMMON TO ALL COUNTS

Plaintiff Great American Tool Company, Inc.'s Patent

7. On August 8, 2006, United States Patent No. 7,086,157 ("the '157 Patent") was duly and legally issued to Alney K. Vallotton, for an invention entitled "FOLDING KNIFE HAVING A BIASED BLADE." A copy of the '157 Patent is attached hereto as Exhibit A.

8. GATCO has been assigned the entire right, title, and interest in the '157 Patent, and is therefore the sole owner of the '157 Patent.

9. GATCO sells a line of knives under the "Vallotton-Ochs Designed KickStart" branding (the "KickStart Knives"), the design of which is disclosed and claimed in the '157 Patent.

Defendant Columbia River Knife and Tool Co.'s Infringement

10. Upon information and belief, Defendant CRKT has been manufacturing, distributing, offering for sale, licensing, leasing, and/or selling knives having a biased blade in this District and throughout the United States.

Columbia River Knife and Tool Co.'s Patent

11. Upon information and belief, Defendant CRKT is the current assignee of U.S. Patent No. 6,834,432, entitled "Pocket Knife With Lock Design," issued on December 28, 2004 (the "'432 Patent," Exhibit B). The '432 Patent was originally assigned to Proceeding Corp., a Taiwan corporation ("Proceeding).

12. GATCO provided Proceeding with the design of the KickStart Knives prior to the alleged invention of the subject matter of the '432 Patent.

13. The subject matter and claims of the '432 Patent were derived from the work of the inventor of the '157 Patent.

14. Defendant CRKT accused the KickStart Knife design of infringing the '432 Patent.

15. Proceeding supplies GATCO with the KickStart Knives currently sold by GATCO in the United States. On information and belief, Proceeding was the assignee of the '432 Patent when the KickStart Knives currently being sold by GATCO in the United States

were supplied to GATCO. As a result, on information and belief, GATCO is a licensee under the '432 Patent for its current KickStart Knives.

16. GATCO has made substantial preparations to make, use, sell and offer to sell KickStart Knives from a supplier other than Proceeding.

COUNT I - INFRINGEMENT OF THE '157 PATENT

17. GATCO repeats and realleges each of the allegations in paragraphs 1 through 16 as if fully set forth herein.

18. Upon information and belief, CRKT has been and is now directly infringing one or more claims of the '157 Patent by manufacturing, using, selling, licensing, leasing, and/or offering for sale a folding knife having a biased blade without the authority of GATCO.

19. Upon information and belief such knives having a biased blade are currently sold as the "OutBurst Folders," and were previously sold as the "OptiFast" line.

20. Upon information and belief, Defendant CRKT has been and is now inducing others to infringe one or more of the claims of the '157 Patent through its sales and/or offering for sale of its "OutBurst Folders" and "OptiFast" line without the authority of GATCO.

21. Upon information and belief, Defendant CRKT's infringement has been willful, wanton, and deliberate, and in knowing and flagrant disregard of GATCO's patent rights.

22. GATCO has been and will continue to be damaged and harmed by CRKT's infringement.

23. GATCO has been and will continue to be irreparably harmed unless CRKT's infringing activities are enjoined.

24. GATCO has no adequate remedy at law.

COUNT II - NON-INFRINGEMENT AND INVALIDITY OF THE '157 PATENT

25. GATCO repeats and realleges each of the allegations in paragraphs 1 through 24 as if fully set forth herein.

26. GATCO has not and does not infringe the '432 Patent.

27. Upon information and belief, Defendant CRKT's allegations of infringement of the '157 Patent by the Kickstart Knives invalidates the '432 Patent.

28. The '432 Patent is invalid for failing to meet the requirements of 35 U.S.C. §§ 102 and 103.

PRAYER FOR RELIEF

GATCO respectfully prays that:

A. Judgment be entered for GATCO.

B. This Court declare that Defendant CRKT has infringed the '157 Patent.

C. This Court preliminarily and permanently enjoin Defendant CRKT, its officers, agents, servants, employees, attorneys, and those persons acting for, with, by, under, in privity with, in active concert with, and in participation with any one of them, from manufacturing, using, selling, licensing, importing, exporting and/or offering for sale the knives having a biased blade or any product which infringes the '157 Patent, and from inducing or contributing to the infringement of the '157 Patent.

D. Defendant CRKT be ordered to send written notification to its dealers, distributors, retailers, and customers for the accused product(s) of its infringing activities, advising of the entry of the injunction and order set forth above, and requiring that the infringing devices still in inventory be returned to Defendant CRKT and that all infringing activities cease.

E. This Court require Defendant CRKT to account for and pay over to GATCO all damages sustained by GATCO including, but not limited to, a reasonable royalty and/or lost

profits due by reason of its infringement, such reasonable royalty and/or lost profits to be based on lost sales.

F. This Court award GATCO treble damages under 35 U.S.C. § 284 as a result of Defendant CRKT's willful patent infringement.

G. This Court declare this case to be exceptional under 35 U.S.C. § 285 and award GATCO its attorneys' fees.

H. Defendant CRKT be required to pay to GATCO all of its costs and disbursements in this action.

I. This Court declare that the KickStart Knives do not infringe the '432 Patent.

J. This Court declare that the '432 Patent is invalid.

K. This Court declare that GATCO is entitled to such other and further relief as the Court may deem just, proper, and appropriate.

Pursuant to Fed. R. Civ. P. 38(b), Plaintiff demands a trial by jury on all issues triable of right, or operation of law, by jury.

Respectfully Submitted,
DARBY & DARBY, P.C.

Dated: May 18, 2007

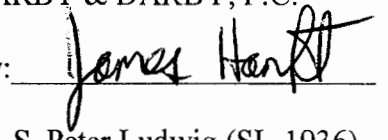
By: 

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EXHIBIT A

US007086157B2

(12) **United States Patent**
Vallotton

(10) **Patent No.: US 7,086,157 B2**
(45) **Date of Patent: Aug. 8, 2006**

(54) **FOLDING KNIFE HAVING A BIASED BLADE**

(75) Inventor: **Alney K. Vallotton**, Oakland, OR (US)

(73) Assignee: **The Great American Tool Company Inc.**, Buffalo, NY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/214,479**

(22) Filed: **Jul. 31, 2002**

(65) **Prior Publication Data**

US 2004/0020058 A1 Feb. 5, 2004

(51) **Int. Cl.**
B26B 1/04 (2006.01)

(52) **U.S. Cl.** **30/159**; 30/160

(58) **Field of Classification Search** 30/160, 30/161, 159
See application file for complete search history.

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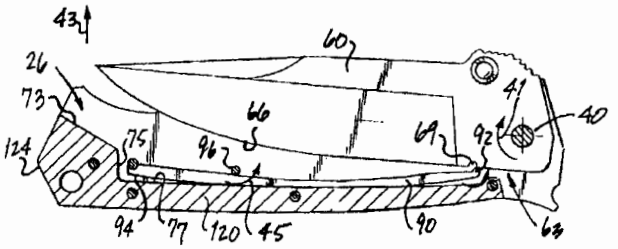
* cited by examiner

Primary Examiner—Charles Goodman
(74) *Attorney, Agent, or Firm*—Darby & Darby

(57) **ABSTRACT**

A folding knife according to one embodiment is provided and includes (a) a handle defining a blade cavity; (b) a blade having a first end which is pivotably coupled to the handle about a pivot; and (c) a biasing element disposed within the blade cavity of the handle. The blade has a detent formed therein on a lower edge thereof proximate to the pivot. The biasing element has a fixed first end and an opposing free second end which has a rounded ball member formed thereat. As the blade is closed towards the retracted position, the blade contacts and deflects the second end of the biasing element until the rounded ball member of the second end engages the blade detent, resulting in the blade being held in the retracted position. As the blade is pivotably opened, the rounded ball member of the second end disengages from the detent and energy stored in the deflected biasing element is released and directed into a biasing force against the blade causing the blade to pivot towards the extended position, thereby assisting a user in opening the blade.

25 Claims, 4 Drawing Sheets



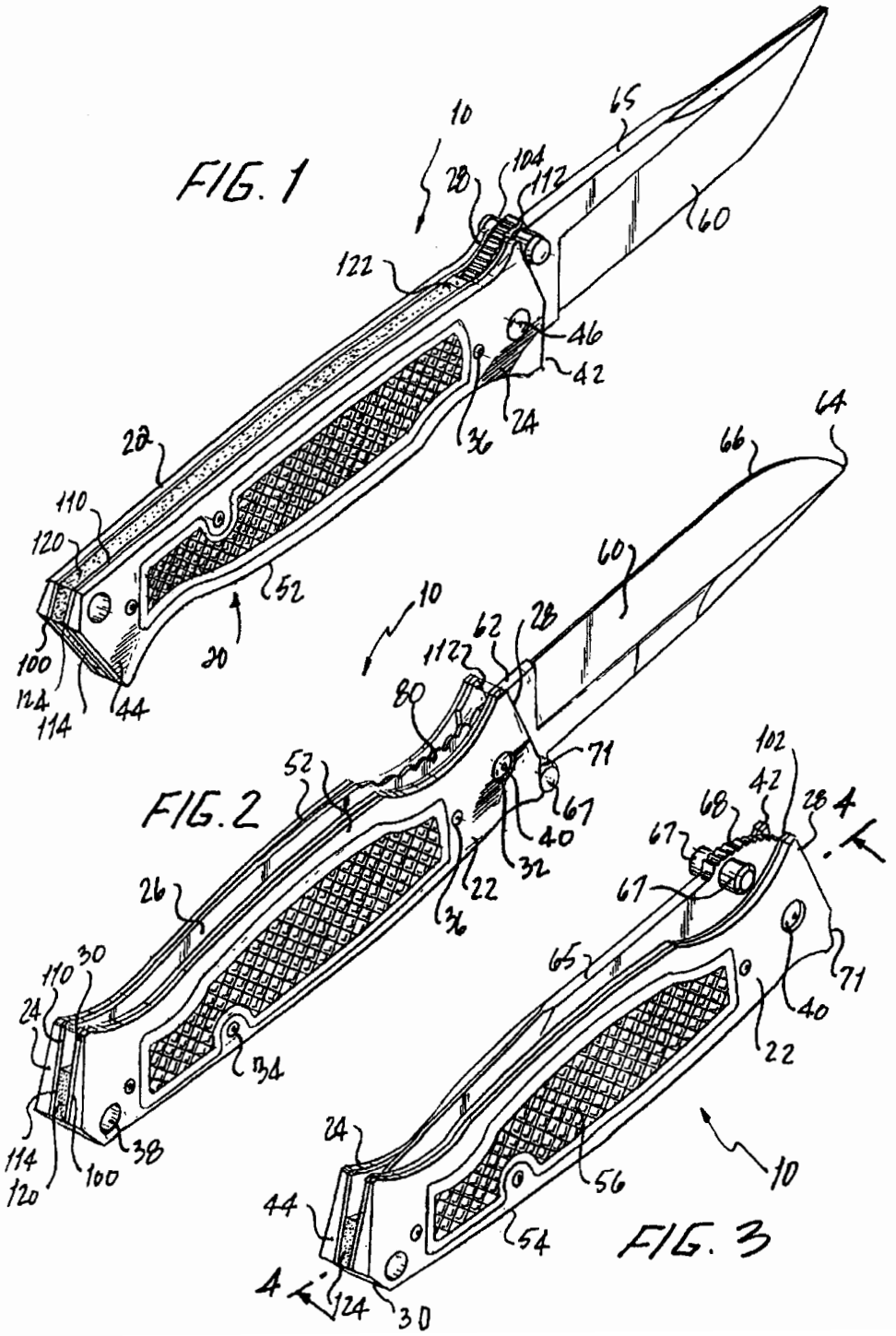

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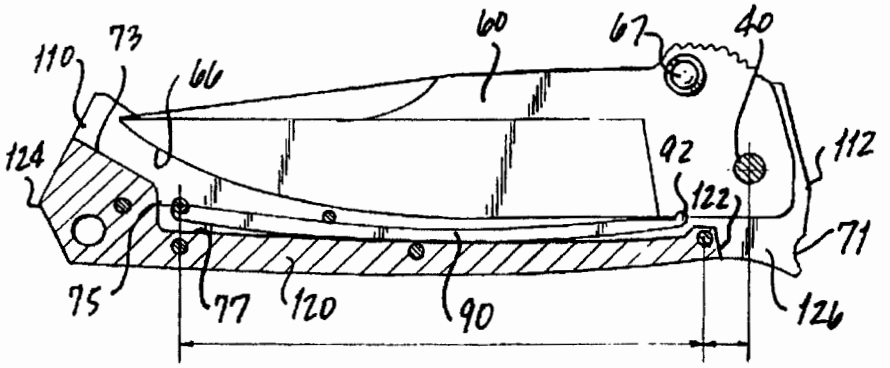
FIG. 1
FIG. 2
FIG. 3

FIG. 4



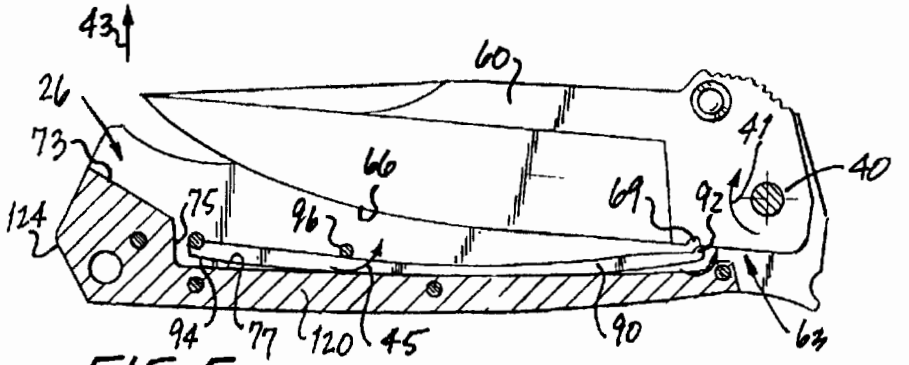


FIG. 5

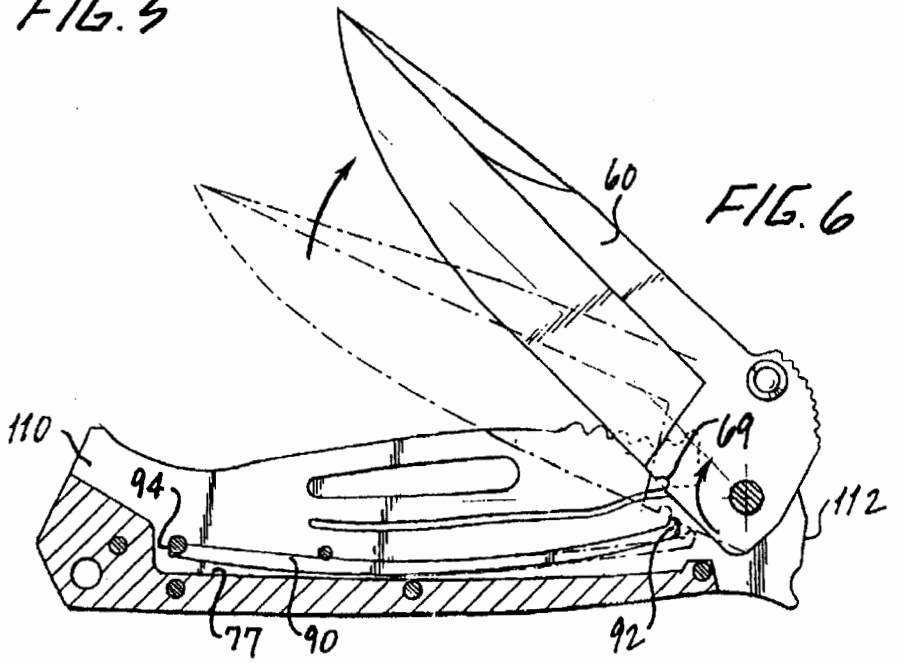


FIG. 6

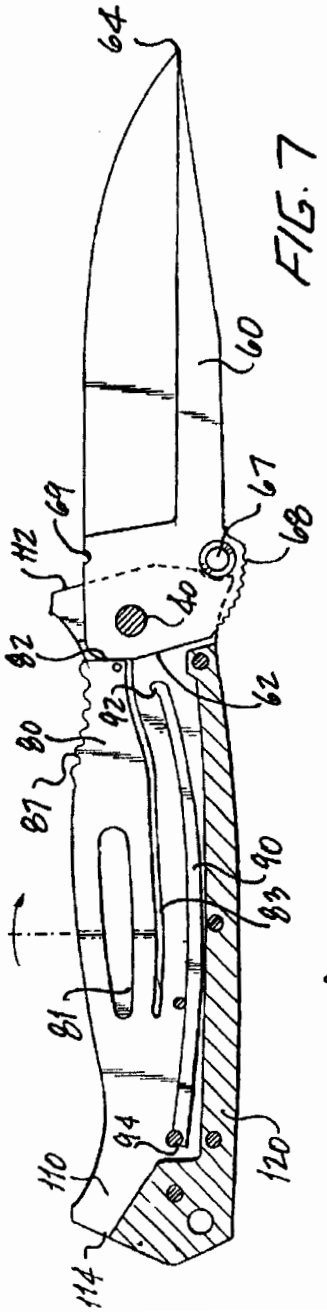

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FIG. 7

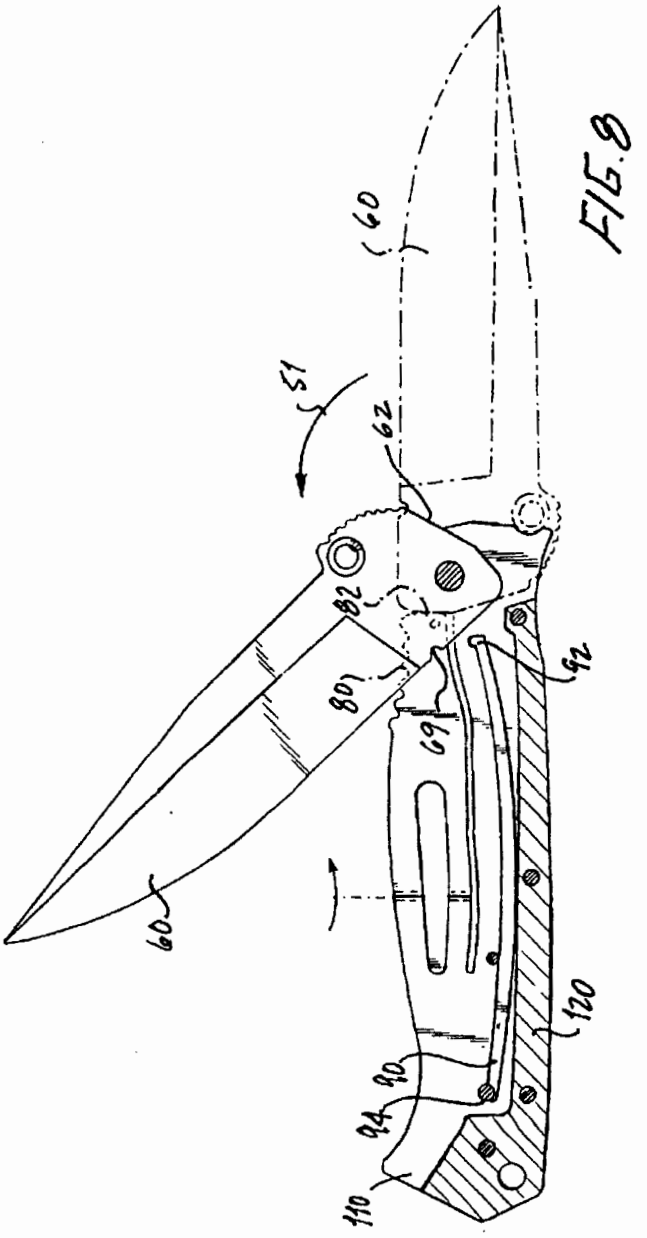
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FIG. 8

FIG. 9

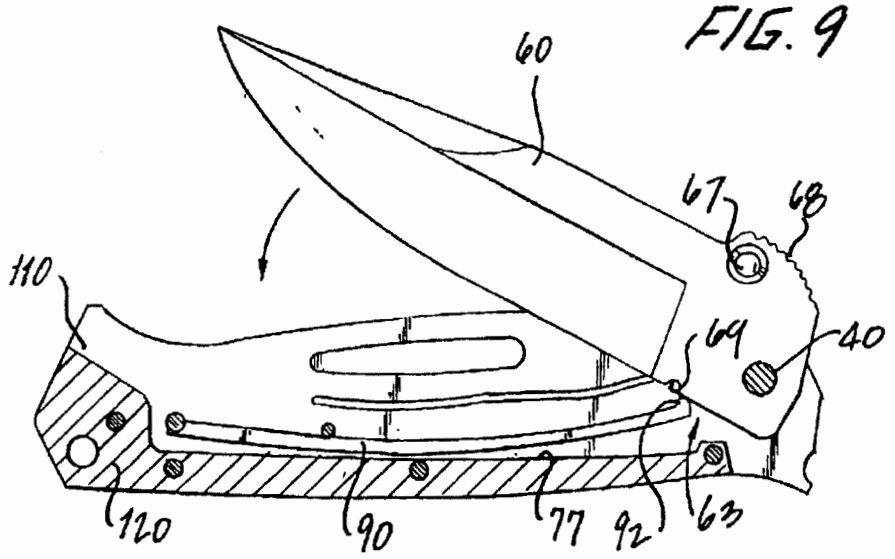


FIG. 10

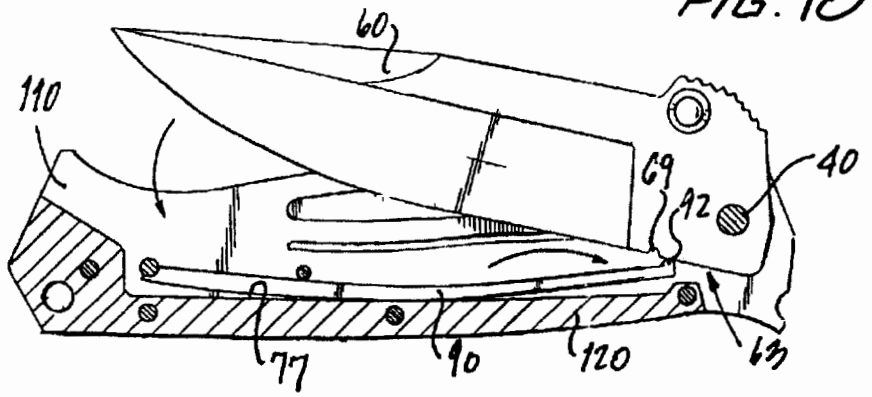
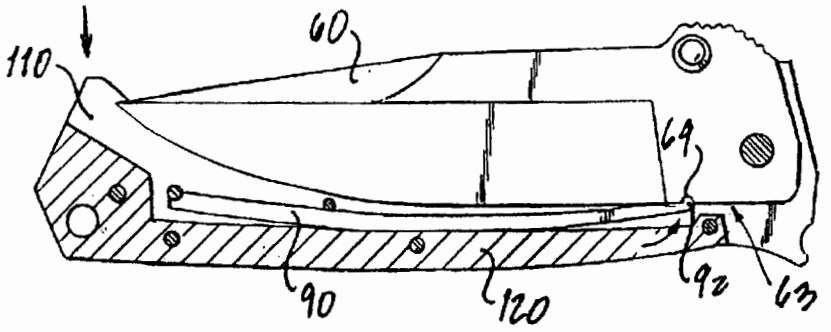


FIG. 11



FOLDING KNIFE HAVING A BIASED BLADE

TECHNICAL FIELD

The present invention relates generally to a folding knife and more particularly, relates to a knife having a biasing element for assisting the user in extending a blade of the knife.

BACKGROUND

A knife is a sharpened instrument typically having a handle portion and a blade. In knives which are not of the foldable or retractable type, the blade permanently extends outwardly from the handle and the knife is stored in a case or the like. Another type of knife is a foldable knife in which the position of the blade may be varied. Folding knives are an attractive option as these types of knives typically permit the blade to be conveniently and safely carried on a person's body (e.g., in a pocket of pants or a jacket) or in a member that is carried by the person (e.g., tackle box, backpack, toolbox, etc.) as well as permitting the knife to be safely stored at a location removed from the person (e.g., drawer, etc.). In many folding knife designs, the blade is positionable between an open position where the blade is extended and a closed position where the blade is retracted into the knife's handle.

A locking mechanism which is part of the handle permits the blade to be locked in the open position as well as the closed position so that the blade cannot freely move and extend from the handle. Folding knives with blades which automatically lock are desirable for safety purposes in that the blade is prevented from closing on the person's hand or fingers during use. However, there may be times when it is not desirable to have the blade locked in the open position, for example, when using the blade for performing a simple task, such as cutting a piece of string or tape or opening a container, like a box. In such situations, closure of the blade would not require the separate deactivation of a blade locking member, which may be the case had the blade been locked.

One of the disadvantages of conventional folding knives is that the task of opening and extending the blade can be a difficult task for some users. For example, this task can require significant pulling force to extract the blade from the folding knife housing. For some users, this is a difficult task and also presents the possibility that the user may become injured while exerting great effort in retracting the blade.

Thus, it would be desirable to provide a folding knife having means for allowing the user to readily open the blade, even when the user is wearing gloves or in situations where the user's hand is disabled to an extent which limits the mobility of the user's fingers in grasping and extracting a conventional blade from a folding knife.

SUMMARY OF THE INVENTION

A folding knife is provided and includes (a) a handle defining a blade cavity; (b) a blade having a first end which is pivotably coupled to the handle about a pivot; and (c) a biasing element disposed within the blade cavity of the handle.

The blade pivots about the pivot between a retracted position where the blade is substantially within the blade cavity and an extended position where the blade is substantially outside of the blade cavity. The blade has a detent formed therein on a lower edge thereof proximate to the pivot. The biasing element is disposed within the blade cavity of the handle. The biasing element has a fixed first end and an opposing free second end which has a rounded ball member formed thereat. As the blade is closed towards the retracted position, the blade contacts and deflects the second end of the biasing element until the rounded ball member of the second end engages the blade detent, resulting in the blade being held in the retracted position due to a contact force being generated between the rounded ball member and at least one surface of the detent. As the blade is pivotably opened, the rounded ball member of the second end slides out of engagement with the detent and energy stored in the deflected biasing element is released and directed into a biasing force against the blade causing the blade to pivot towards the extended position, thereby assisting a user in opening the blade.

Other features and advantages of the present invention will be apparent from the following detailed description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other features of the present invention will be more readily apparent from the following detailed description and drawings of illustrative embodiments of the invention in which:

FIG. **1** is a top perspective view of a folding knife according to an exemplary embodiment with a blade of the knife being in an extended position;

FIG. **2** is a bottom perspective view of the folding knife of FIG. **1**;

FIG. **3** is a bottom perspective view of the folding knife of FIG. **1** with the blade of the knife being in a retracted position;

FIG. **4** is a cross-sectional view of the folding knife of FIG. **3** taken along the line **4**—**4**;

FIG. **5** is a cross-sectional view of the exemplary folding knife with the blade in a first intermediate position;

FIG. **6** is a cross-sectional view of the exemplary folding knife with the blade in a second intermediate position;

FIG. **7** is a cross-sectional view of the exemplary folding knife with the blade being in an extended position;

FIG. **8** is a cross-sectional view of the exemplary folding knife with the blade being moved to a first intermediate position as the user closes the blade;

FIG. **9** is cross-sectional view of the exemplary folding knife with the blade being further closed to a second intermediate position with the blade contacting a biasing element of the knife;

FIG. **10** is a cross-sectional view of the exemplary folding knife with the blade being further closed to a third intermediate position with the biasing element being deflected; and

FIG. **11** is a cross-sectional view of the exemplary folding knife with the biasing element being further deflected and in engagement with the blade.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring first to FIGS. **1** through **3**, a biased folding knife according to one exemplary embodiment is generally indicated at **10**. The folding knife **10** includes a handle portion **20**, a blade **60**, a locking feature **80**, and a biasing element **90** (FIG. **4**) for assisting the user in extending the blade **60** from a retracted position to an extended position.

The handle portion **20** is formed of several components including a first outer handle member **22** and an opposing

second outer handle member **24**, which preferably are mirror images of one another. The first and second handle members **22**, **24** can be formed from any number of suitable materials, including plastics (e.g., fiber reinforced plastics), metals, etc. The handle portion **20** also includes a first inner handle support plate **100** adjacent the first handle member **22**, an opposing second inner handle support plate **110** adjacent the second handle member **24** and a handle core **120** disposed between the first and second handle plates **100**, **110**, which are all preferably formed of metal.

When these handle components are attached to one another, a blade cavity **26** is defined between the first and second inner handle plates **100**, **110** and above the handle core **120**. The blade cavity **26** is configured to carry the blade **60**. The first handle member **22** includes a first end **28** and an opposite second end **30**. At the first end **28**, an opening **32** is formed for receiving a pin **40** about which the blade **60** pivots as will be described in greater detail hereinafter.

The first handle member **22** also includes a number of openings **34** formed therein which receive fasteners **36** for securely connecting the handle components. For example, screws **36** can be inserted into the openings **34** and used to attach the various handle component to one another. At the second end **30**, an opening (bore) **38** is formed in the first handle member **22**. The opening **38** can be used to receive a cord or the like to permit the folding knife **10** to be easily worn or hung.

The first inner handle plate **100** is attached to first handle member **22** and preferably is similarly or identically shaped thereto. The first handle plate **100** includes a first end **112** which aligns with the first end **28** and a second end **114** which aligns with the second end **30**. A notch **71** is formed at the first end **112**. The first inner handle plate **100** receives the fasteners **36**, thus securely attaching the first handle member **22** to the first inner handle plate **100** and also receives the pin **40** for permitting the pivoting movement of the blade **60**. The first handle plate **100** defines an upper side wall of the blade cavity **26**.

The second handle member **24** is preferably a mirror image of the first handle member **22**. The second handle member **24** includes a first end **42** and an opposing second end **44** with the first end **42** being spaced from first end **28** and the second end **44** being spaced from the second end **30**. At the first end **42**, an opening **46** is formed and is axially aligned with the opening **32** so that the pin **40** extends across the handle components with the blade **60** pivoting about the pin **40**. The second handle member **24** also contains openings to receive fasteners **36** so as to attach the second handle member **24** to the second inner handle plate **110** as well as other handle components. An opening **38** is formed at the second end **44** for forming the bore that extends through the second ends **30**, **44** as well as through the first and second inner handle plates **100**, **110** and the core **120**.

The second handle plate **110** is disposed adjacent the second handle member **24** and includes a first end **112** which aligns with the first end **42** and a second end **114** which aligns with the second end **44**. The first end **112** has a notch **71** formed therein.

The core **120** is preferably a metal core member that extends substantially the length of the folding knife **10**. As best shown in FIG. **1**, the core **120** has a first end **122** that is orientated near the first ends **28**, **42** of the first and second handle member **22**, **24** and an opposing second end **124** that preferably aligns with the second ends **30**, **44**. The first end **122** does not align with the first ends **28**, **42** but rather terminates prior to the first ends **28**, **42** so that a space **126** (FIG. **4**) is formed. The space **126** is designed to permit the blade **60** to pivot into and out of the blade cavity **26** as the blade cavity **26** is formed above the core **120**. The core **120** is described in greater detail hereinafter with reference to later figures.

Each of the first and second handle members **22**, **24** includes a contoured upper edge **52** and an opposing contoured bottom edge **54**. An outer surface of each of the first and second handle members **22**, **24** can contain a roughened portion **56** which serves as a gripping portion to assist the user in grasping and holding the folding knife **10**. This is particularly helpful when the folding knife **10** is used in less than ideal conditions, such as wet conditions due to rain or the knife **10** being used near a wet environment.

The blade **60** includes a first end portion **62** and a second, tipped portion **64** substantially opposite the first end portion **62**. A sharpened cutting edge **66** is provided on blade **60** as part of a lower surface **63** thereof. Opposite the lower surface **63** is an upper surface **65** which includes ridges **68** formed at the first end portion **62**. Preferably, the ridges **68** are formed on a curved portion of the upper surface **65** that extends from the first end to a location close to the first end. The ridges **68** act as a thumb engaging portion to which the user applies a force using his/her thumb to cause the blade **60** to close from the extended position. The blade **60** also has a pair of opposing pins **67** that are formed near the inner section of the ridges **68** and protrude outwardly from planar surfaces of the blade **60**. The pins **67** are preferably axially aligned with one another and are circular members. Optionally, the pins **67** include a roughened peripheral surface to facilitate a gripping action between the user and the pins **67**.

The pins **67** also serve as stoppers that limit the range of the extension of the blade **60**, as shown in FIGS. **1** and **2**. When the blade **60** is fully extended, the pins **67** engage ends **28**, **42** of each of the first and second handle members **22**, **24**, respectively, as well as ends **102**, **112** of the first and second handle plates **100**, **110** so as to limit the angle that the blade **60** can extend. As shown in FIG. **3**, the ends **28**, **42** preferably include a section **71** that is complementary to both the dimensions and the shape of the pins **67**. When the blade **60** is fully extended, the pins **67** seat within the sections **71**, each of which in the exemplary embodiment is an arcuate notch which mates with the circular pins **67**. The notches **71** of the first and second handle members **22**, **24** are complementary to and in alignment with the notches **71** of the first and second handle plates **100**, **110** to provide notched grooves that receive pins **67**.

When the blade **60** is fully retracted, the pins **67** are disposed above the upper edges **52** of the first and second handle members **22**, **24**. Preferably, the section of each upper edge **52** that is generally below each pin **67** when the blade **60** is fully retracted has a curved profile so as to permit the user to insert his/her fingers under the pins **67**, thereby permitting the user to exert pressure on the pins **67** and push the blade **60** into an open position, as will be described in greater detail later. In the fully retracted position, a length of the upper surface **65** of the blade **60** will likely extend above the upper edges **52** of the first and second handle members **22**, **24**.

FIGS. **4** through **7** illustrate the operation of opening the blade **60** from the fully retracted position of FIG. **4** to the fully extended position of FIG. **7**. FIG. **4** is a cross-sectional view taken along the line **4**—**4** of FIG. **3** and illustrates the core **120** in cross-section. As illustrated in FIG. **4**, the second end **124** of the core **120** has a beveled edge **73** that is

disposed below the sharped cutting edge **66** at the second, tipped end portion **64**. A shoulder **75** is formed at one end of the beveled edge **73** and leads down to a generally planar lower surface **77**, which defines in part the blade cavity **26**.

The biasing element **90** of the folding knife **10** is disposed in the blade cavity **26** between the first and second handle plates **100**, **110**. The biasing element **90** has a first end **92** and an opposing second end **94**. The second end **94** is fixed in place as by a fastener or the like which attaches to at least the first and second handle plates **100**, **110** (FIG. **1**) and may further be attached to the first and second handle members **22**, **24** (FIG. **1**). However, it will be understand that any number of means can be used to fix the second end **94** in place. The first end **92** is in the form of a ball end such that the first end **92** has an arcuate shape and forms an arcuate transverse ridge. The biasing element **90** extends across the blade cavity **26**, generally above the planar lower surface **77**. The movement of the biasing element **90** is held in place by a pin **96** that is disposed along the length of the biasing element **90** between the first and second ends **92**, **94**. The biasing element **90** is thus held in place and its range of deflection is limited by disposing the biasing element **90** between the planar lower surface **77** and the pin **96**. Preferably, the pin **96** is disposed closer to the attached second end **94** as compared to the first end **92**.

According to the illustrated exemplary embodiment, the lower surface **63** of the blade **60** contains a detent **69** formed therein near one end of the sharpened cutting edge **66**. The detent **69** is in the form of a notch cut into the blade **60**. The exemplary detent **69** has a generally semi-circular shape. In other words, the shape of the detent **69** is complementary to the shape of the first end **92** of the biasing element **90** and therefore, according to the exemplary embodiment, the semi-circular detent **69** is sized and shaped to receive the arcuate ridge that defines the first end **92**.

FIG. **4** shows the blade **60** in a retracted position. In this position, the biasing element **90** assumes a deflected position as the closing of the blade **60** causes the first end **92** to be deflected towards the planar lower surface **77**. In this retracted position, the arcuate ridge at the first end **92** of the biasing element **90** is disposed within the detent **69** of the blade **60**. A length of the deflected biasing element **90** contacts the planar lower surface **77** in this fully retracted position. It will be appreciated that the length of the biasing element **90**, as measured longitudinally across the blade cavity **26**, varies according to the deflection condition of the biasing element **90**. In other words, the straight-line distance between the first and second ends **92**, **94** is greatest when the blade **60** is in the fully retracted position, thereby causing deflection of the biasing element **90**. The biasing element **90** naturally wants to assume a curled, deflected position and thus when it is deflected, an amount of energy is stored in the biasing element **90**. In other words, when the blade **60** is closed, the biasing element **90** is placed in tension along its length because the force created by the detent **69** on ball end **92** of the biasing element **90** causes the biasing element **90** to deflect.

For purpose of simplicity only, FIGS. **5** through **7** illustrate the user grasping the blade **60** near the second, tipped portion **64** thereof; however, it will be understood that the pins **67** are intended to serve as contact points between the user's fingers and the blade **60** to assist the user in opening the blade **60**. For example, the user can engage the pins **67** with his/her fingers to exert a force (e.g., a pushing force) on the blade **60** to cause the blade **60** to lift from its retracted position and open.

The blade **60** pivots about the pin **40** as shown by the arrow **41** in FIG. **5** when the user lifts the blade in the direction of arrow **43**. The initial deflection direction of the biasing element **90** is illustrated by the arrow **45** and as can be seen, once the tension of the biasing element **90** is slowly released, the biasing element **90** deflects about the pin **96**. FIG. **5** illustrates the arcuate ridge at the first end **92** of the biasing element **90** moving along the curved surface of the detent **69** to a location where the first end **92** is just free of the detent **69** and engages the generally planar lower surface **63** of the blade **60**. This relative movement between the first end **92** and the detent **69** is caused by the user opening the blade **60** in the direction **43**.

Because the first end **92** is in the form of an arcuate ridge, the first end **92** can effectively roll against an opposing surface, such as the detent **69** and/or the planar surface **63**. Another advantage of forming the first end **92** to have arcuate features which complement the arcuate features of the detent **69** is that the first end **92** is permitted to move within the detent **69** and slide into and out of the detent **69** with some ease. Conversely, if the first end **92** and detent **69** had sharp edges, such movement would not be possible and once the first end **92** aligned with the detent **69**, the first end **92** would fall into and engage the detent **69** but would not easily become disengaged therefrom.

FIG. **6** shows further opening of the blade **60** with a first position of the blade **60** being shown in phantom and a next second position of the blade **60** being shown. As the blade **60** opens, the first end **92** of the biasing element **90** travels along the planar surface **63** as the biasing element **90** continuously deflects due to a release of the energy stored in the biasing element **90**. The deflection direction of the biasing element **90** is in the same general direction as the direction that the user is pulling the blade **60** and thus, the deflection of the biasing element **90** and its contact with the blade **60** as it deflects, actually assists the user in opening the blade **60** to the fully extended position shown in FIG. **7**. As will be described in greater detail hereinafter, once the first end **92** of the biasing element **90** clears the detent **69**, the deflection force generated by the biasing element **90** pushes the blade **60** outwardly towards the fully extended position.

As the blade **60** is opened, there comes a point where the first end **92** of the biasing element **90** becomes removed from contact with the planar surface **63** due to a number of factors, including the length of the biasing element **90**, the angle of the blade **60** relative to the lower surface **77**, the location of the pivot point (pin **40**) of the blade **60** relative to the biasing element **90**, etc. Once the first end **92** is no longer in contact, the biasing element **90** assumes its rest position, where any stored energy has been released (as best shown in FIG. **7**). The blade **60** continues to pivot about pin **40** until the blade assumes the fully extended position shown in FIG. **7**. As will be described later, the locking feature **80** engages the first end **62** of the blade **60** to effectively releasably lock the blade **60** in the fully extended position. In this fully extended position, the first end **92** of the biasing element **90** and the first end **62** of the blade **60** are spaced from one another.

FIGS. **8** through **11** illustrate the closing of the blade **60** from the fully extended position (in phantom in FIG. **8**) to the fully retracted position of FIG. **11**. To close the blade **60**, the locking feature **80** is first released, thereby permitting the blade **60** to move in a closing direction, generally indicated by arrow **51**. Once again, FIGS. **8** through **11** show the user's fingers grasping the blade **60** near the second end **64** for purpose of illustration only and it will be appreciated that the user can use pins **67** and ridged section **68** for closing the blade **60**. FIG. **8** shows an intermediate position of the blade **60**, where the blade **60** is not yet in contact with the biasing element **90**, which is in a relaxed position.

FIG. **9** shows the further closing action of the blade **60** with the blade **60** being pivoted about the pin **40** and into contact with the biasing element **90**. More specifically, the first end **92** of the biasing element **90** contacts the planar surface **63** outside of the detent **69**. As previously, mentioned, the arcuate features of the first end **92** permit the first end **92** to slide along planar surface **63** as the blade **60** is retracted. Once the blade **60** contacts the first end **92**, a force is applied against the biasing element **90** to cause deflection of first end **92** of the biasing element **90** in a direction towards the planar lower surface **77**.

The blade **60** is shown in a further closed position in FIG. **10**. In this position, the biasing element **90** is further deflected (resulting in more energy being stored therein) at the first end **92** and the arcuate ridge formed at the first end **92** remains in contact with the surface **63**. As one will appreciate the straight-line distance between the ends **92**, **94** of the biasing element is greater in the condition of the biasing element in FIG. **10** compared to the condition of FIG. **9**. In other words, the biasing element **90** is being compressed to a deflected position, where the biasing element **90** is "straighter".

FIG. **11** shows the blade **60** in its fully retracted position. The exemplary folding knife **10** is configured such that the blade **60** rests in the fully retracted position even though the biasing element **90** remains deflected (compressed) in this position. This is a result of a number of characteristics that are associated with the biasing element **90** and the location of the detent **69**. More specifically and as previously-mentioned, the length of the biasing element **90** varies as it becomes more and more deflected, with the length of the biasing element **90** increasing as it further deflects. Once the biasing element **90** is fully deflected and the blade **60** is further pivoted during the closing operation, the detent **69** effectively "catches up" with the second end **92** such that when the blade **60** is completely in the closed (horizontal) position, the detent **69** effectively is aligned with the second end **92**. More specifically, after the biasing element **90** assumes the deflected position, the further pivoting of the blade **60** causes the detent **69** to rotate into engagement with the second end **92**.

Thus, the slope of the detent **69** relative to the degree of curvature of the first end **92** is such that, in the fully retracted position, the biasing element **90** generates a contact force on the blade **60** that acts generally horizontal, as indicated by the arrow **53**, and this causes a moment (torque) where the blade **60** is urged in a counter-clockwise direction. At the same time, the biasing element **90** has an upward force component; however, this upward force component is overcome by the generally horizontal contact force generated between the biasing element **90** and the blade **60**. This results in the blade **60** remaining in the closed, fully retracted position. The location of the detent **69** and the length of the biasing element **90** should be selected so that in the fully retracted position, the upward deflection force of the first end **92** is overcome by a counterforce, thereby permitting the first end **92** to seat against the blade **60** without causing a clockwise, opening motion by the blade **60**. The location of the detent **69** relative to the pivot point (i.e., pin **40**) of the blade **60** is also carefully selected such that the above-described forces result and the blade **60** remains in the closed position.

In order for the upward force component of the biasing element **90** to overcome the generally horizontal force component, the length of the biasing element **90** must decrease; however, the seating position of the first end **92** within the detent **69** does not permit such length reduction. However, once the user lifts the blade **60** slightly and begins to pull the blade **60** in a clockwise direction, the first end **92** is freed from its static position within the detent **69** and is free to move within the detent **69**. Accordingly, the length of the biasing element **90** can now decrease and as it decreases, the first end **92** tracks along the sloped surface of the detent **69**. As the first end **92** moves along the detent **69**, the horizontal force component is reduced or eliminated, thereby resulting in the upward force component being the predominant force component generated by the biasing element **90**. This upward deflection force continues as the first end **92** clears and is free from the detent **69** and contacts the surface **63**. In other words, once the first end **92** is removed from the position where the upward deflection force is the inferior force and is placed in a position where the upward deflection force is the superior force, the natural deflection of the biasing element **90** acts against the blade **60** to cause a clockwise rotation of the blade **60** about the pivot **40**.

In one exemplary embodiment, the biasing element **90** comprises a an elongated spring element; however, it will be understood that a number of different springs having different configurations can be used, e.g., a leaf spring, so long as the spring functions in the manner described hereinbefore.

The biasing element **90** is thus configured to assist the user in opening the blade **60** by applying a force (in the clockwise direction) to the blade **60**. The biasing element **90** thus provides a very simple yet effective mechanism for assisting the user in opening the blade **60**. This overcomes the disadvantage of conventional folding knives in which a significant amount of force is needed to pull the blade from the fully retracted position to a fully extended position. For some individuals, the opening of the blade can be a difficult task and thus, the present arrangement provides a folding knife which can be used easily by a larger number of the consumers.

Referring to FIGS. **6–11**, the second inner handle plate **110** has an automatic locking feature **80** that serves to releasably lock the blade **60** in the fully extended position. FIG. **7** shows the locking feature **80** engaging the blade **60** so as to effectively lock the blade **60** in the fully extended position. The operation of the locking feature **80** is best illustrated in reference to FIGS. **6** through **11**. The locking feature **80** is formed near the first end **112** of the second inner handle plate **110** opposite the second end **114** which is fixed in position. The first end **112** aligns with the first end **42** of the second handle member **24** (FIG. **1**); however the locking feature **80** is formed prior to the first end **112** and is constructed so as to permit a portion of the second inner plate **110** to be flexedly biased proximate to the pivotal first end **62** of the blade **60**.

The locking feature **80** is constructed so that it is a biased member (e.g., a tongue like member) that is formed as part of the second handle plate **110** with the locking feature **80** being positionable between a lock position and an unlock position. Because the locking feature **80** is formed as part of the second inner handle plate **110**, the locking feature **80** extends a length of the blade cavity **26** and as shown in the Figures, and the locking feature **80** extends along the blade cavity **26** on one side of the biasing element **90**.

The locking feature **80** is formed by altering the construction of the second inner handle plate **110** so as to create a biased tongue that flexes inwardly and outwardly near the first end **62** of the blade **60** depending upon the position of the blade **60**. For example, the locking feature **80** (biased tongue) can be formed by forming one or more openings **81**

and one or more slots **83**, to create the biasing characteristics of the locking feature **80**. The locking feature **80** has a locking surface **82** that preferably has a complementary surface profile as the first end **62** of the blade **60** (as shown in FIG. **7**) so that the locking surface **82** becomes flexedly displaced in the blade cavity **26** and seats against or at least along the axis of rotation of the blade **60**. The locking surface **82** is actually an end of the biased tongue-like structure **80** and thus the locking surface **82** creates interference with the blade **60** and prevents pivoting movement of the blade **60** once the locking feature **80** assumes this locked position. This acts as a safety mechanism in that the blade **60** is prevented from freely pivoting out of the fully extended position (the position where the knife is being used in some capacity) even if the blade **60** contacts an object and/or a force is applied to the blade **60** in a direction that normally would pivot the blade **60**.

The locking feature **80** is constructed so that in the normal rest position, the locking feature **80** assumes a deflected position where the locking surface **82** flexes inwardly into the blade cavity **26** and into a position where the aforementioned interference is created between the locking surface **82** and the blade **60**. In other words, the locking feature **80** is naturally biased so that it assumes a position with the locking feature **80** (and locking surface **82**) being inwardly deflected unless some interference is created to prevent the locking feature **80** from assuming this deflected position. When the blade **60** is in the retracted position (FIG. **4**) and when the blade **60** is being pivotally opened, the blade **60** itself creates the interference with the locking feature **80** that prevents the locking feature **80** from assuming the deflected position. This interference results because the feature **80** is formed as part of the second inner handle plate **110** that is axially disposed on one side of the blade **60**.

The locking feature **80** has a roughened surface profile **87** at an upper edge thereof near the locking surface **82** to assist the user in disengaging the locking feature **80** from its locked position and thereby free the blade **60** for pivoting movement. To move the locking feature **80** from the locked position to the unlocked position, the user simply contacts the profile **87** and applies a force in the direction towards the second handle member **24**, thus causing the locking feature **80** to flex outwardly. In other words, the user overcomes the biasing force by applying a greater force in an opposite direction as the direction of the biasing force. The locking surface **82** disengages from the first end **62** of the blade **60**, thereby permitting the blade **60** to pivotally rotate about **40** and into the blade cavity **26**. Once the locking feature **80** is removed from the axis of rotation of the blade **60**, the blade **60** can freely pivot into the cavity **26** where it then makes contact with the biasing element **90** as previously described. Once the first end **62** of the blade **60** is pivoted a predetermined amount, it becomes disposed within the cavity **26** so as to prevent the locking feature **80** from flexing inwardly and therefore, the user can remove the applied force to the locking feature **80**. The locking feature **80** will likely flex slightly inward once the applied force is removed; however, the locking feature **80** will encounter the first end **62** of the blade **60**, which prevents its further inward flexing, while permitting the blade **60** to continue to pivotally rotate.

The present folding knives thus provide reliable, easy to use folding knives that each includes a biased blade to assist the user in opening the blade and also a locking feature that is biased such that it automatically locks the blade when the blade is opened.

While the invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. A folding knife comprising:

a handle defining a blade cavity;

a blade having a first end which is pivotably coupled to the handle about a pivot and a second end which includes a sharpened edge, the blade pivoting about the pivot between a retracted position where the blade is substantially within the blade cavity and an extended position where the blade is substantially outside of the blade cavity, the blade having a detent formed therein on a lower edge thereof proximate to the pivot; and

a biasing element disposed within the blade cavity of the handle, the biasing element having a fixed first end and an opposing free second end which has a profile, wherein as the blade is closed towards the retracted position, the blade deflects the second end of the biasing element until the profile of the second end engages and is retained within the blade detent, resulting in the blade being held in the retracted position, and wherein as the blade is pivotably opened, the profile of the second end becomes disengaged from the detent and energy stored in the deflected biasing element is released and directed into a biasing force that pivots the blade towards the extended position, thereby assisting a user in opening the blade.

2. The folding knife of claim **1**, wherein the handle includes a core member defining a lower surface of the blade cavity and at least one handle member disposed on each side of the core.

3. The folding knife of claim **2**, wherein the blade pivot extends through the handle members and the core at one end thereof.

4. The folding knife of claim **1**, wherein the blade pivot comprises a pin extending across the blade cavity of the handle, the blade being pivotably rotated about the pin.

5. The folding knife of claim **1**, wherein the blade includes a pair of opposing pins extending outwardly from an outer surface of the blade proximate the first end of the blade.

6. The folding knife of claim **1**, wherein the detent comprises a notch formed in the lower surface of the blade.

7. The folding knife of claim **6**, wherein the notch has an arcuate shape.

8. The folding knife of claim **2**, wherein the biasing element is disposed between the blade and the lower surface of the blade cavity.

9. The folding knife of claim **1**, wherein the biasing element comprises an elongated leaf spring.

10. The folding knife of claim **1**, wherein the first end of the biasing element is fixed by a pin.

11. The folding knife of claim **1**, further including:

a retaining pin disposed above the biasing element but below the blade, the retaining pin limiting upward movement of the biasing element while creating a pivot point about which the biasing element pivots.

12. The folding knife of claim **1**, wherein the profile of the second end of the biasing element comprises an arcuate ridge.

13. The folding knife of claim **1**, wherein the biasing element generates in the retracted position a deflection force which is less than or equal to a contact force generated between the second end of the biasing element and the detent of the blade resulting in the blade remaining in the retracted position.

14. The folding knife of claim **13**, wherein the deflection force is generated in a direction away from a lower internal

surface of the handle, the biasing element being disposed between the lower surface and the blade.

15. The folding knife of claim **1**, wherein the second end of the biasing element has a shape complementary to a shape of the detent to permit reception and retention of the second end within the detent.

16. The folding knife of claim **13**, wherein the detent has a first sloped section such that in the retracted position, the second end of the biasing element is urged against the sloped section, thereby generating the contact force.

17. The folding knife of claim **1**, wherein in the retracted position, a length of the biasing element between the first and second ends seats against a lower internal surface of the handle.

18. The folding knife of claim **1**, further including:

a locking member formed as part of the handle, the locking member automatically biased to the locking position once the blade pivotally clears a locking surfaces of the locking member as the blade is pivotally opened.

19. The folding knife of claim **18**, wherein the locking member comprises a biased tongue defined by a slot formed in an inner handle plate that defines one side of the blade cavity and is a part of the handle.

20. The folding knife of claim **1**, wherein the biasing element pivots in a counter clockwise direction and the blade pivots in a clockwise direction when the blade is opened from the retracted position.

21. The folding knife of claim **1**, wherein the second end of the biasing element contacts and applies biasing force against a section of the lower surface of the blade extending between the detent and the first end of the blade.

22. A folding knife comprising:

a handle defining a blade cavity;

a blade having a first end which is pivotably coupled to the handle about a pivot and a second end, the blade pivoting about the pivot between a retracted position where the blade is substantially within the blade cavity and an extended position where the blade is substantially outside of the blade cavity, the blade having a detent formed therein on a lower edge thereof proximate to the pivot; and

a biasing element disposed within the blade cavity of the handle, the biasing element having a fixed first end and an opposing free second end which has a rounded ball member formed thereat, wherein as the blade is closed towards the retracted position, the blade contacts and deflects the second end of the biasing element until the rounded ball member of the second end engages the blade detent, resulting in the blade being held in the retracted position due to a contact force being generated between the rounded ball member and at least one surface of the detent, and wherein as the blade is pivotably opened, the rounded ball member of the second end slides out of engagement with the detent and energy stored in the deflected biasing element is released and directed into a biasing force against the blade causing the blade to pivot towards the extended position, thereby assisting a user in opening the blade.

23. A folding knife comprising:

a handle defining a blade cavity;

a blade having a first end which is pivotably coupled to the handle about a pivot and a second end which includes a sharpened edge, the blade pivoting about the pivot between a retracted position where the blade is substantially within the blade cavity and an extended position where the blade is substantially outside of the blade cavity, the blade including a receiving feature formed therein along one edge thereof proximate to the second end; and

a biasing element disposed within the blade cavity of the handle, the biasing element having a fixed first end and an opposing free second end which has an engaging feature formed thereat such that as the blade is closed towards the retracted position, the blade deflects the second end of the biasing element causing the engaging feature to travel along the one edge until it engages and is retained within the receiving feature, resulting in the blade being held in the retracted position, and wherein as the blade is pivotably opened, the engaging feature clears the receiving feature and energy stored in the deflected biasing element is released and directed against the blade as a biasing force that pivots the blade towards the extended position, thereby assisting a user in opening the blade.

24. The folding knife of claim **23**, wherein the engaging feature comprises a rounded protrusion formed at the second end.

25. The folding knife of claim **23**, wherein the receiving feature comprises a curved notch formed in a lower edge of the blade.

* * * * *

EXHIBIT B

US006834432B1

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Taylor, Jr.

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(54) **POCKET KNIFE WITH LOCK DESIGN**

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(58) **Field of Search** 30/161, 160, 331, 30/133, 155, 159, 158, 340; 7/118, 119, 120

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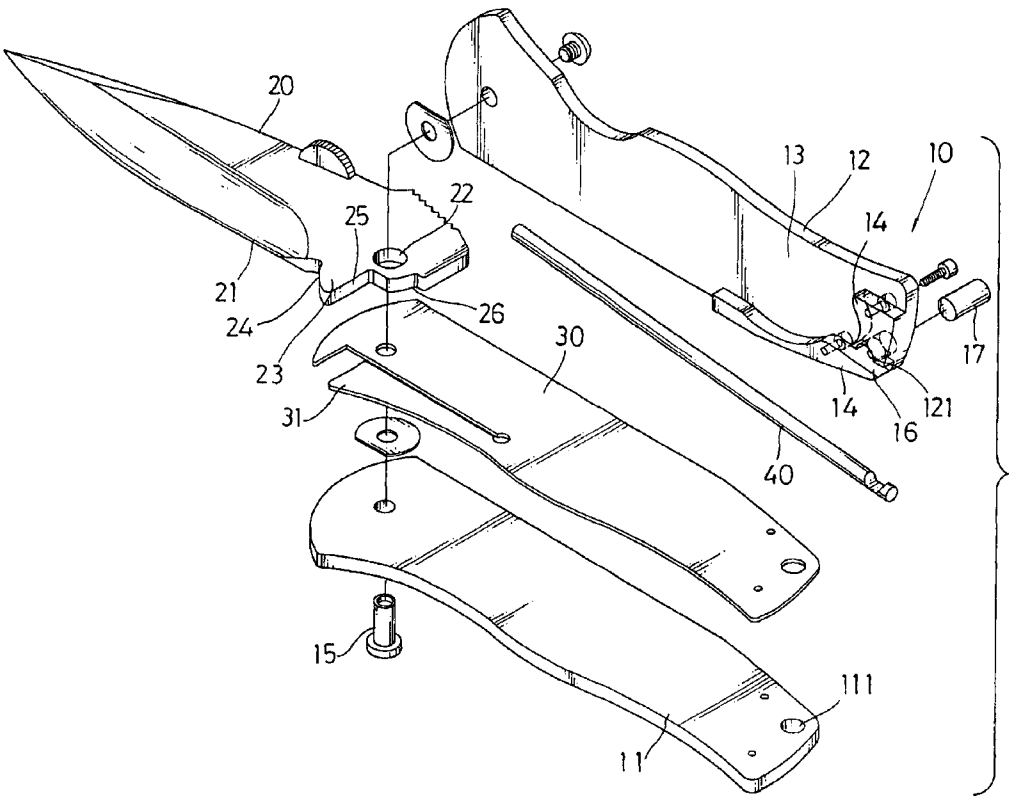
(57) **ABSTRACT**

A pocket knife with lock design is disclosed. This foldable knife has a pivot joint, a blade controlled by the pivot joint, a safety lock corresponding to the side wall of the blade, and a resilient pin, wherein the back end of the blade has a shoulder and a pin catch. The safety lock has a spring tab with a raised head that is moved to touch the back of the blade after the blade is pulled out from the handle by a predetermined angle. The resilient pin is placed in a chamber within inner space of the handle, where one end pushes against the shoulder of the blade for supplementing the driving force to pull out the blade to an open position.

9 Claims, 9 Drawing Sheets



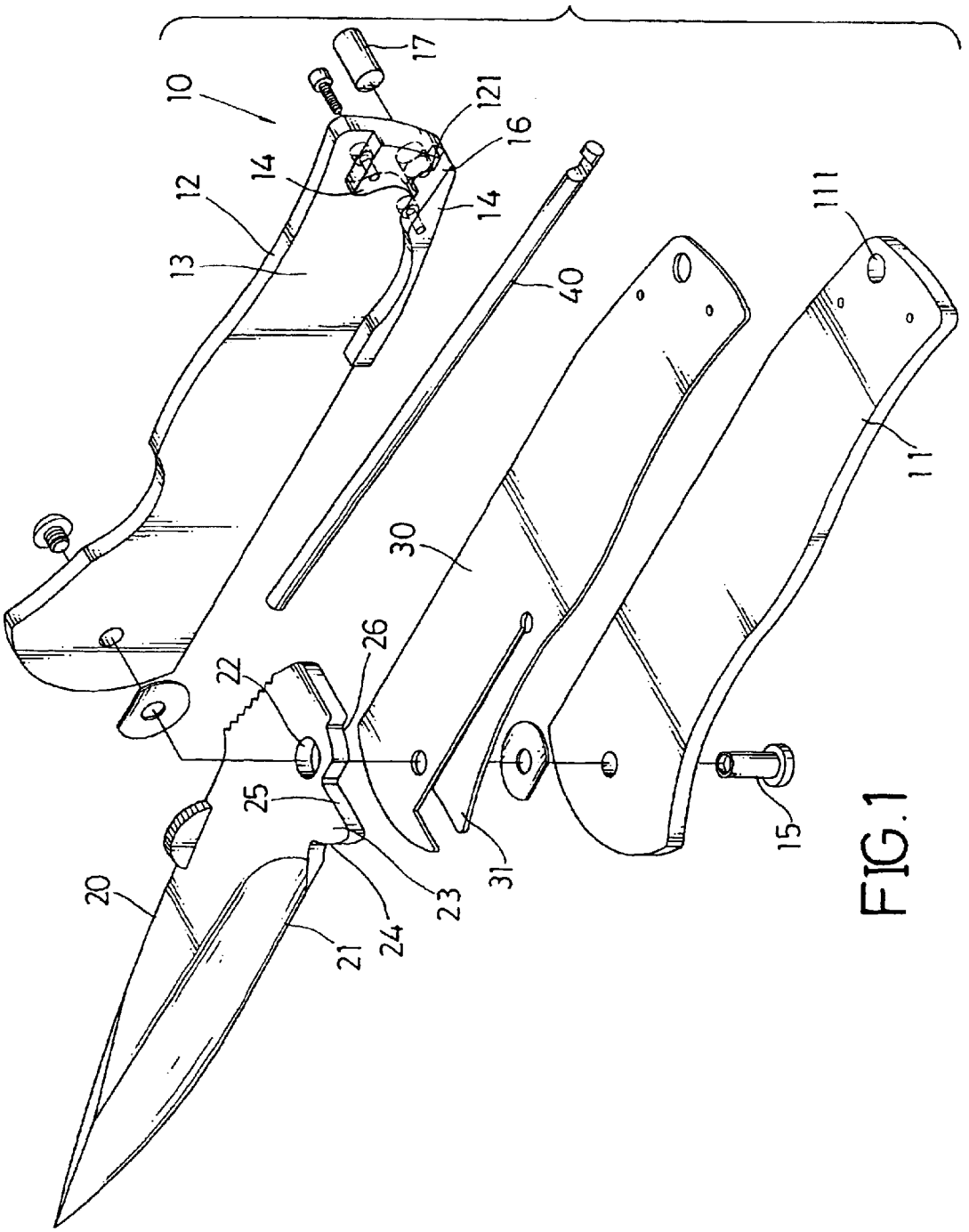


FIG. 1

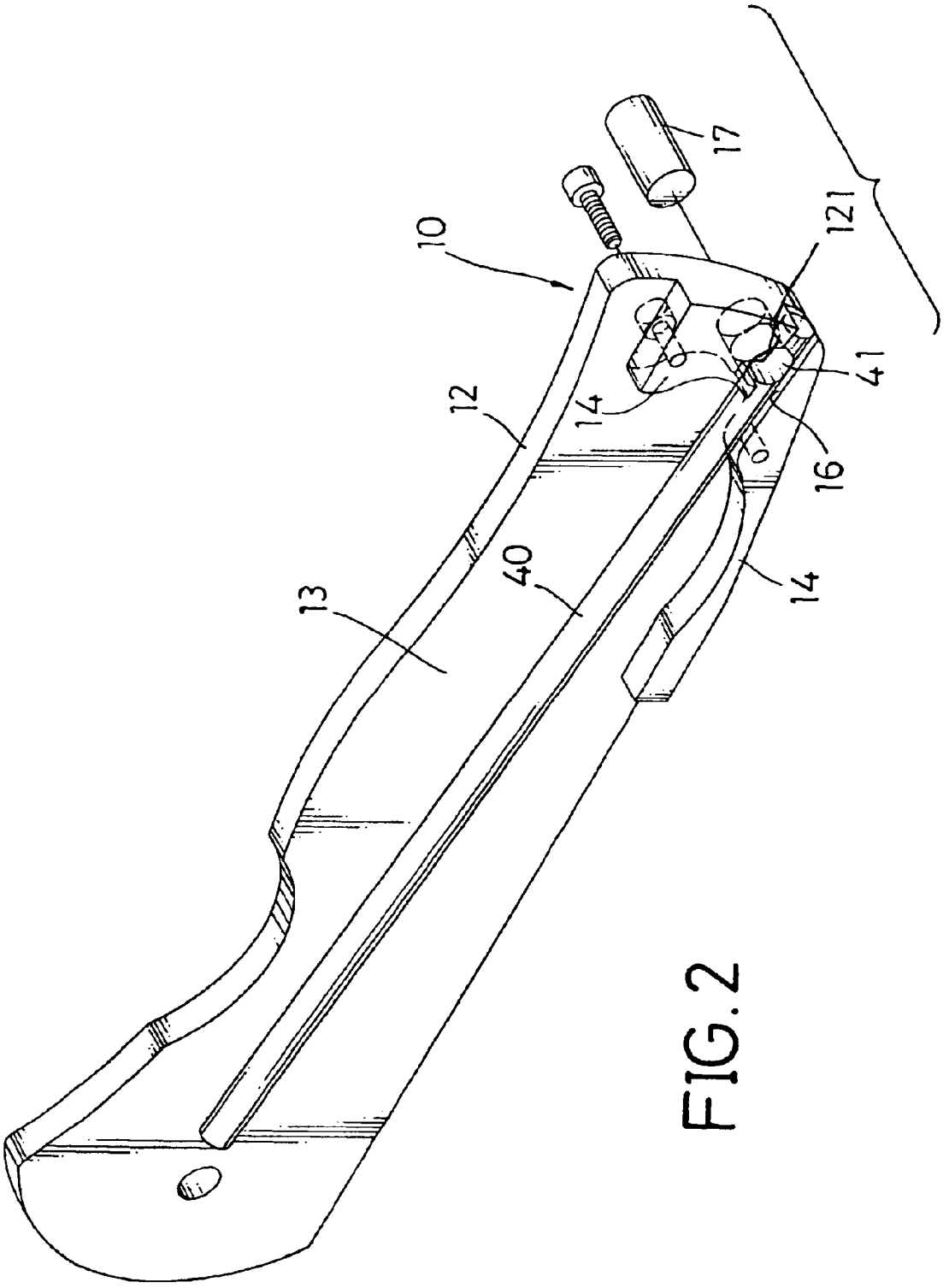


FIG. 2

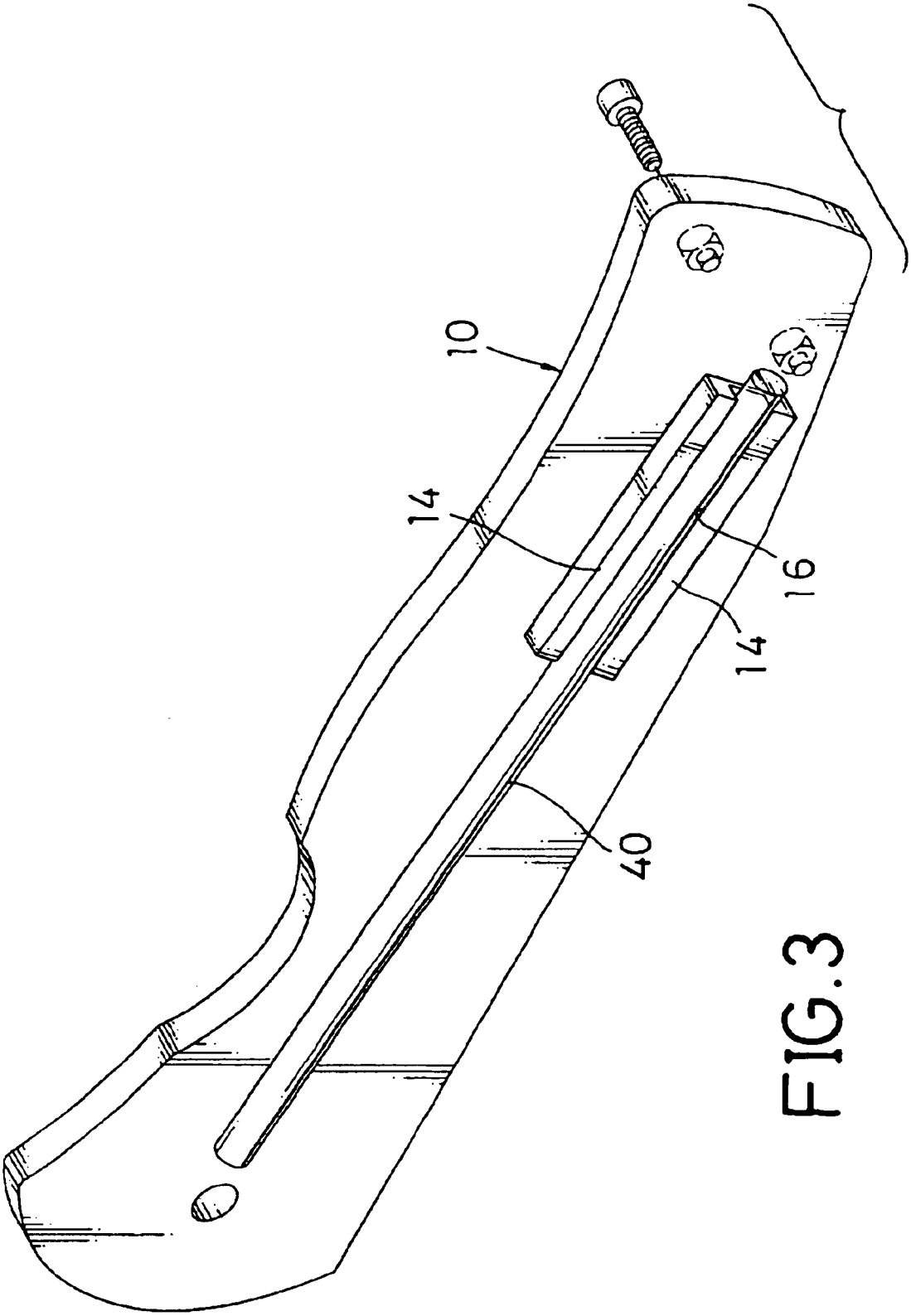


FIG. 3

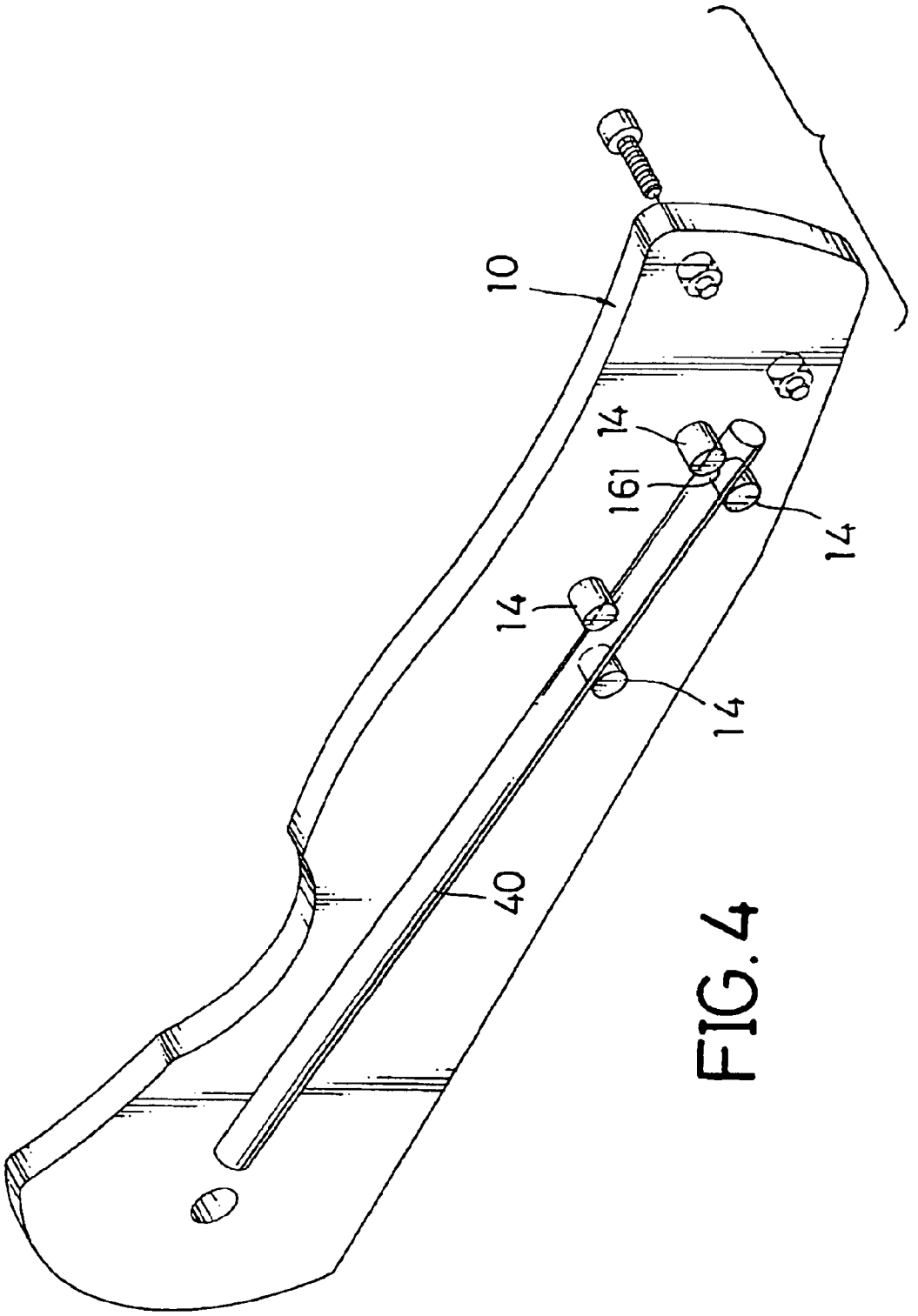


FIG. 4

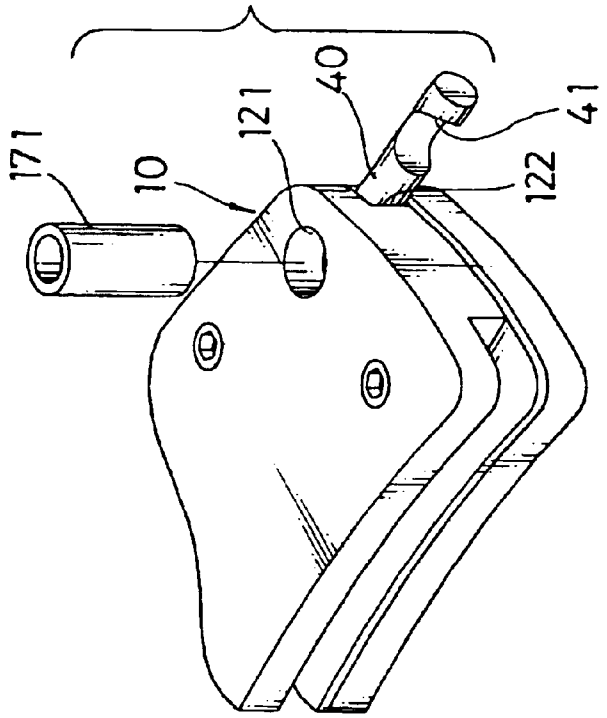


FIG.6

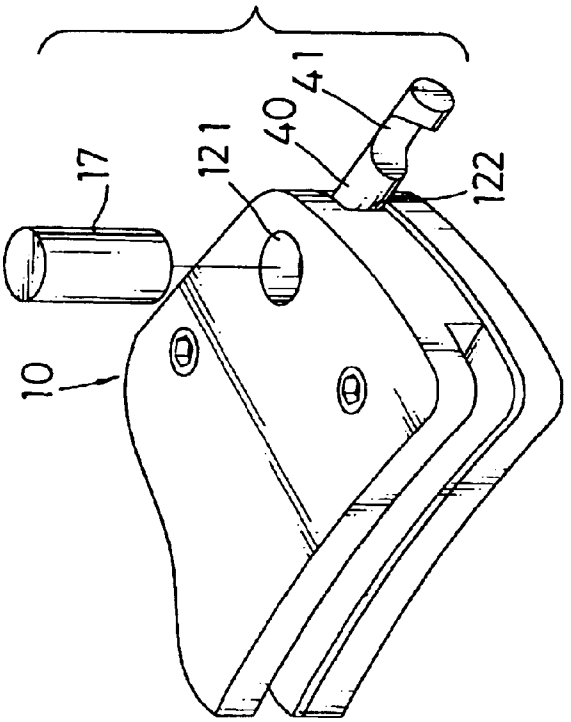


FIG.5

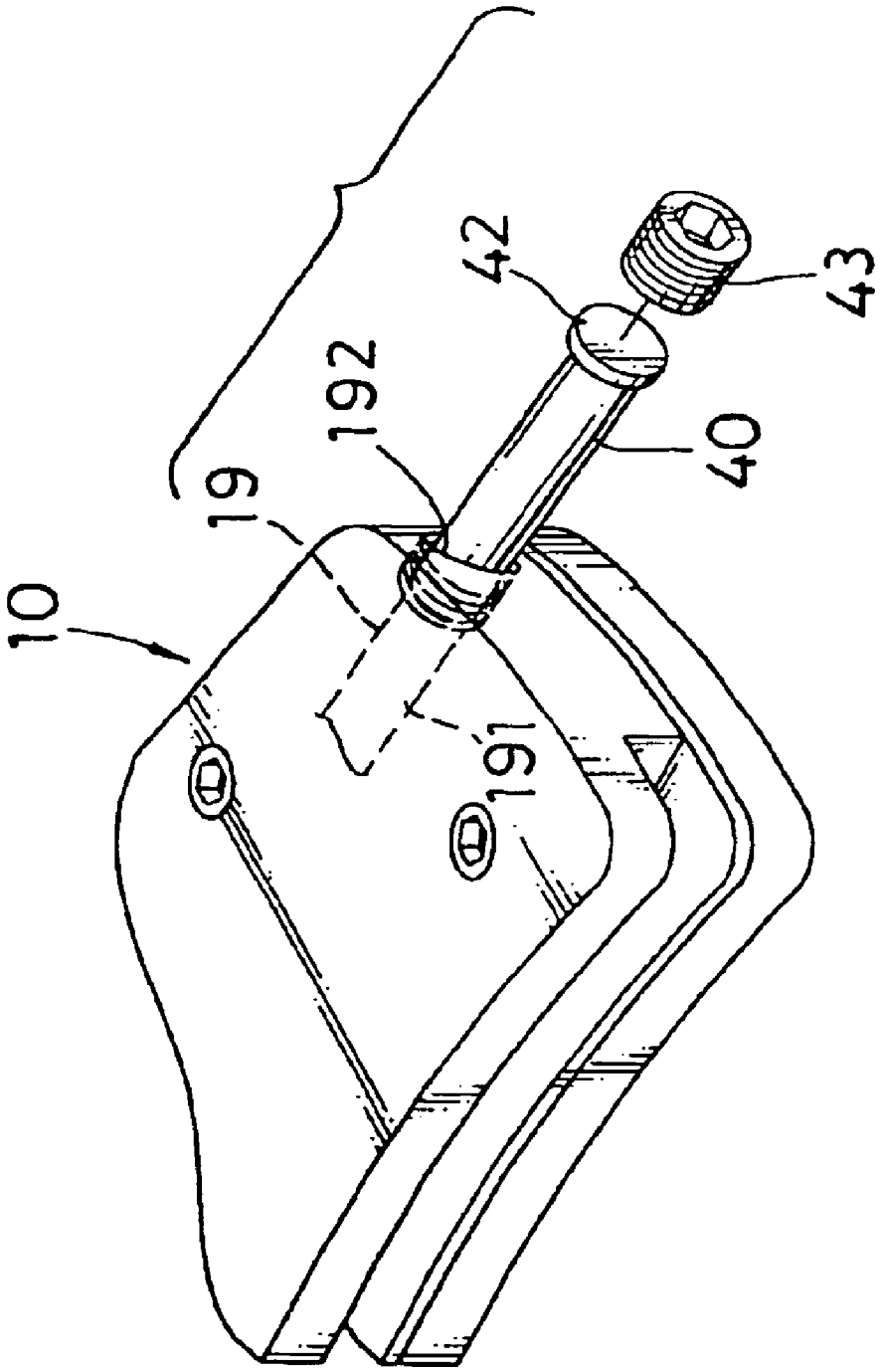


FIG. 7

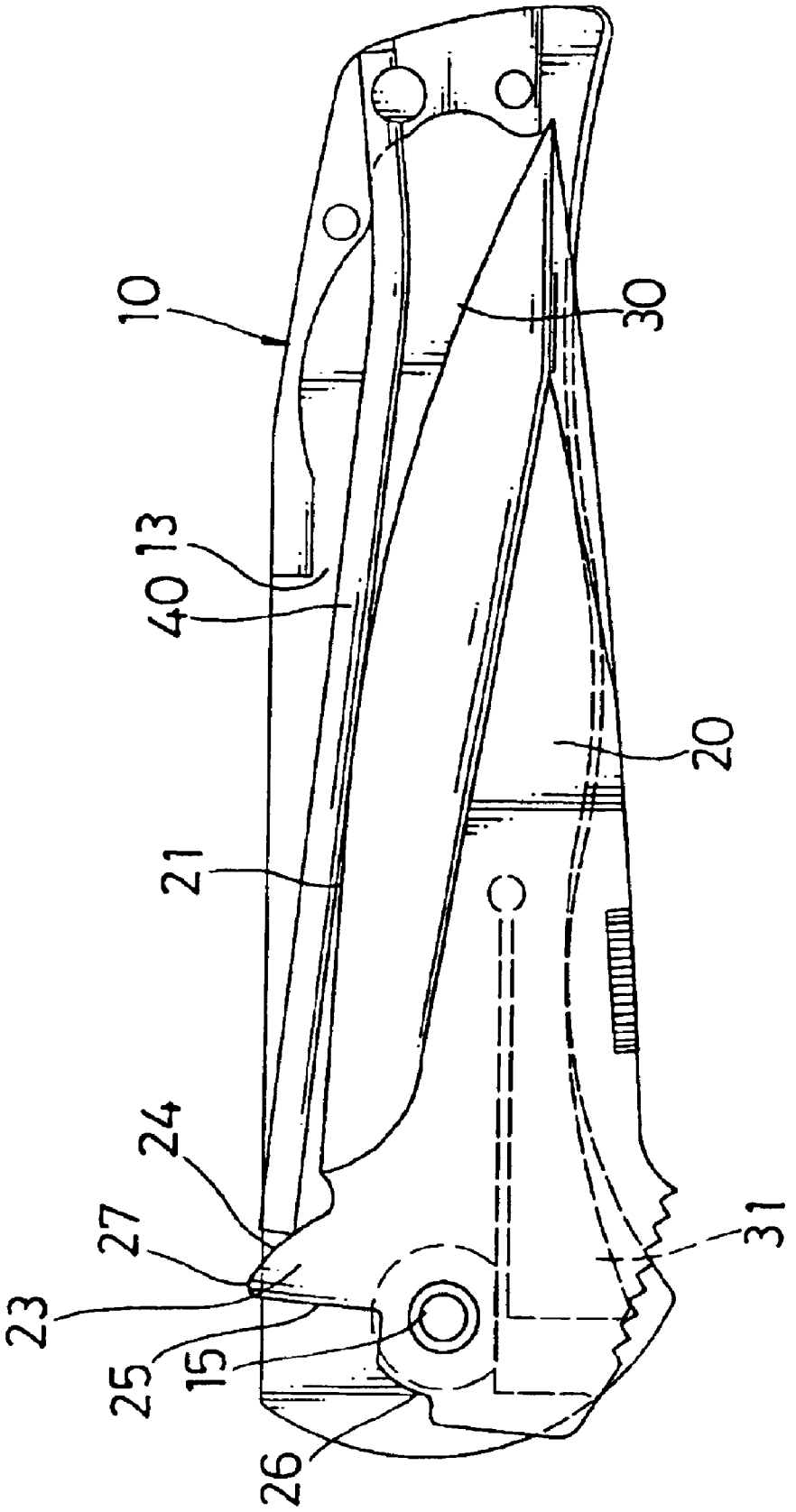


FIG. 8

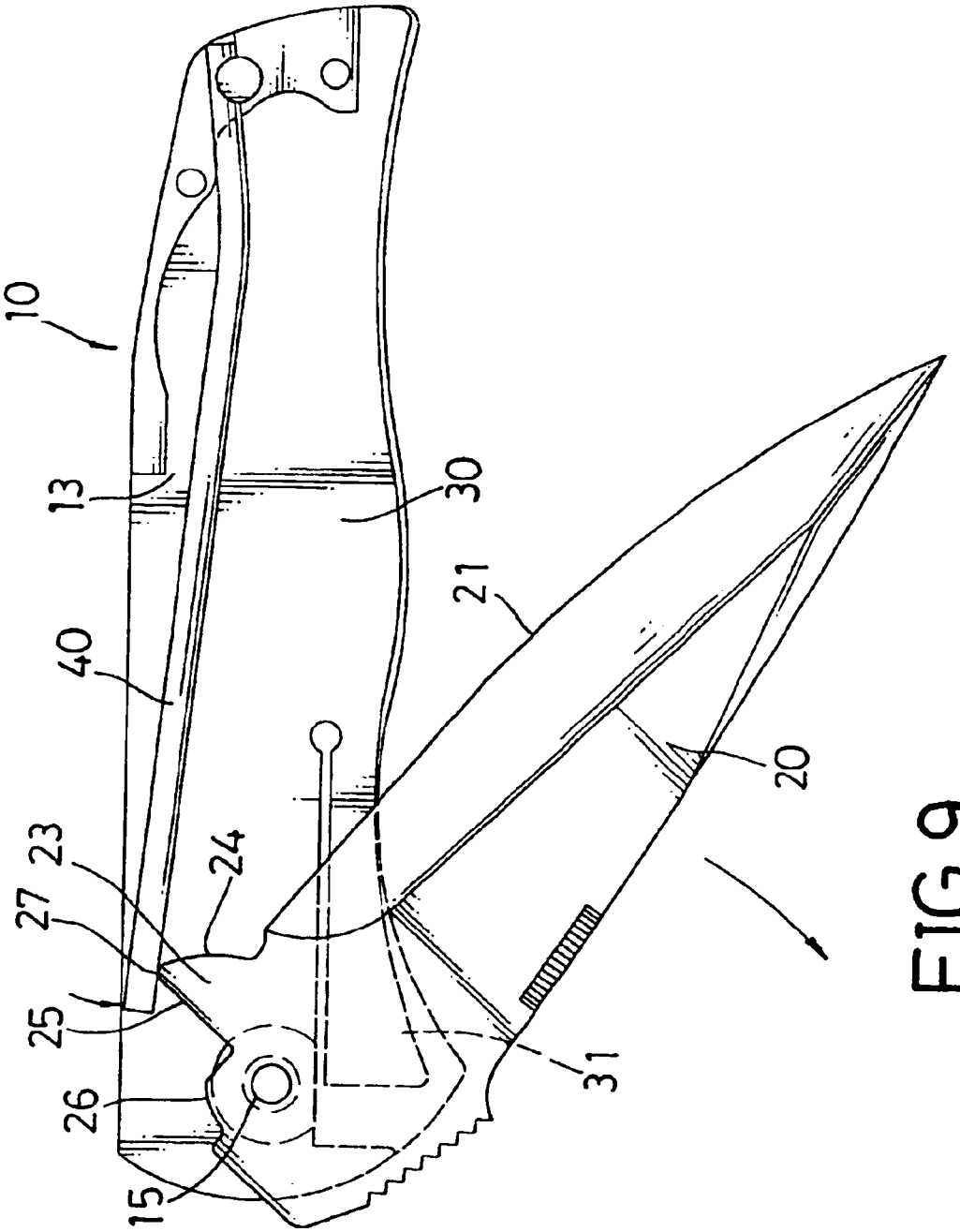


FIG.9

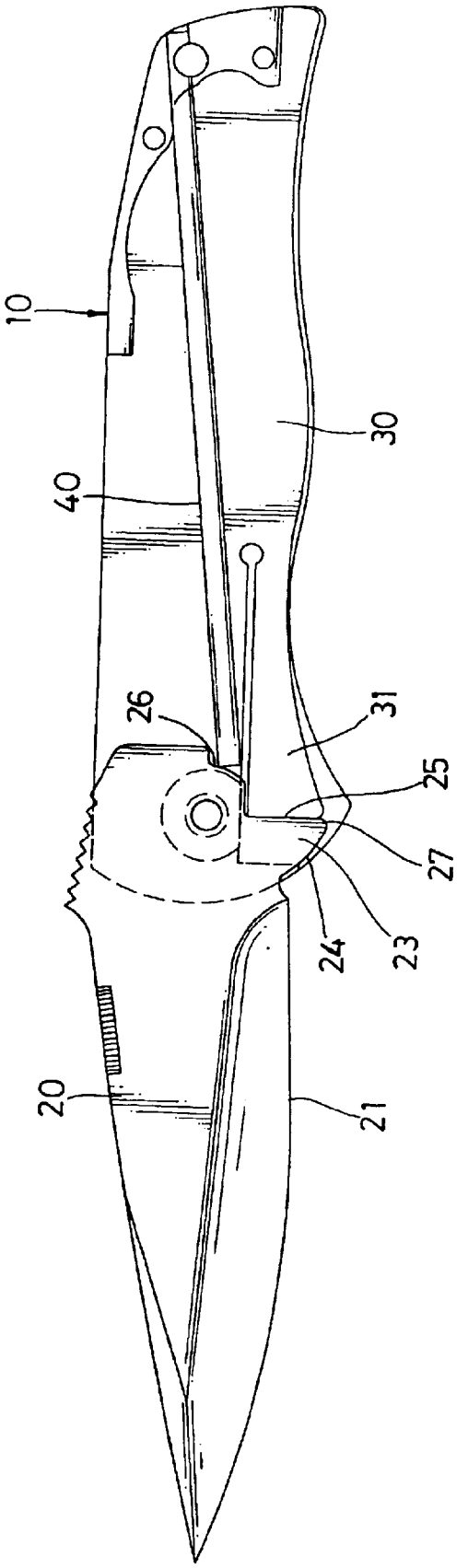


FIG.10

POCKET KNIFE WITH LOCK DESIGN

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a pocket knife with a lock design, in particular to a foldable knife that provides supplemental driving force to extend the blade of the knife from the handle to an open position by a semi-automatic operation.

2. Description of Related Arts

The current designs of pocket knives can be categorized as the flick knife and the foldable knife. The flick knife utilizes the pressing force on the lock release mechanism of the handle to unlock the spring, and then the recoiling force of the spring causes the blade to shoot out from the front end of the handle. According to the designs of flick knives, the blade moved by the recoiling force of the spring can also cause bodily harm to the user if the flick knife is not properly handled. If the flick knife is dropped accidentally when being carried or operated improperly, the razor-sharp blade may be ejected automatically when the knife falls to the ground and receives a jolt.

However, by the design of the foldable knife, the movement of the blade is controlled by a pivot joint, and the blade has to be opened out and returned manually, and is received in the inner space of the handle. Unlike the flick knife, the foldable knife does not use any spring mechanism to extend the blade from the handle. This design makes it safer to operate but, at the same time, sacrifices some operability.

Since the design of conventional foldable knife cannot provide automatic opening of the knife and operation safety at the same time, a modified foldable knife has been proposed by the applicant, in which the structure of the modified foldable knife has incorporated a supplemental driving aid, formed by a holding block, a guide roller and a resilient pin installed inside the handle, such that when the user pulls out the blade from the handle of the knife at a predetermined angle, then a supplemental driving force will be produced by the action of the resilient pin to assist the extension of the blade to the open position, thus enhancing the operability by means of a semi-automatic operation.

Although the modified foldable knife design is able to meet the users' expectation for automatic operation, the mechanical driving aid of the foldable knife requires the addition of a guide roller in the handle corresponding to the side wall of the blade that takes the pressure from by the resilient pin. therefore, the thickness of the handle has to be increased to meet the above requirement. However, the enlarged size of the foldable knife will affect the portability of the knife, and also the guide roller and the resilient pin as part of the mechanical driving aid to supplement the extension of the blade do not work in perfect unison at all times.

SUMMARY OF THE INVENTION

The main object of the present invention is to provide a pocket knife with a lock design incorporating a supplemental mechanical driving aid to solve the prior art problem of thickness of the foldable knife and to improve the supplemental driving force when extending the blade from the handle.

To this end, the present invention uses a pivot joint at the front end of handle to control the movement of the blade, a safety lock placed inside handle corresponding to the side wall of blade in the closed position, and a resilient pin installed in the handle corresponding to the back end of the blade, wherein the back end of the blade has a shoulder for engaging the resilient pin and a pin catch. The safety lock has a spring tab with a raised head, which is used to press against the back end of the blade when the blade is being extended from the handle, and the resilient pin is installed inside the chamber of the handle, where one end is fixed, and the other end is pushed against the shoulder of the blade, for supplemental driving force blade when the blade is being extracted from the handle.

The present invention provides a pocket knife with a foldable design that allows the blade to be received within the inner space of the handle.

The present invention also provides a supplemental driving aid that can force the blade of a pocket knife to extend by means of a semi-automatic operation.

The present invention also provides a simplified structural design for a pocket knife by providing a suitable thickness of the handle to meet the portability and storage requirements.

The present invention is also characterized in that a resilient pin is used in the design to drive the blade directly when the blade is being pulled out from the handle to the open position.

The features and structure of the present invention will be more clearly understood when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an exploded diagram of the pocket knife with a lock design in accordance with the present invention;

FIG. **2** is a partial assembly of the pocket knife previously shown in FIG. **1**;

FIGS. **3** and **4** are different designs of the holding blocks to hold the resilient pin inside the handle;

FIGS. **5-7** are different designs used to fix the resilient pin inside the handle;

FIG. **8** is a plan view of the pocket knife previously shown in FIG. **1** currently having the blade in the closed position.

FIG. **9** is a plan view of the pocket knife previous shown in FIG. **1** currently having the blade pulled out at a predetermined angle;

FIG. **10** is a plan view of the pocket knife previously shown in FIG. **1** currently having the blade fully extended.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention is illustrated in conjunction with a first preferred embodiment as shown in FIG. **1**. This foldable knife has a handle **(10)** including a pivot joint **(15)**, a blade **(20)** controlled by the pivot joint **(15)**, a safety lock **(30)** corresponding to the side wall of the blade **(20)**, and a resilient pin **(40)**. The handle **(10)** is formed by a first half **(11)** and a second half **(12)**, and has an opening at the front. The first and second halves **(11, 12)** are joined together in a conventional manner such as by using screw, rivets and so on. A chamber **(13)** is defined by the side walls of the handle **(10)** for holding the resilient pin **(40)**. The pivot joint **(15)** is formed at the front end of handle **(10)** for receiving the blade **(20)** into the handle **(10)**.

A holding block **(14)** is installed on a side wall of the chamber **(13)** opposite to the pivot joint **(15)** for holding one end of the resilient pin **(40)** firmly in position.

The blade **(20)** has an axis, a cutting side **(21)**, a blunt side, a pointed end and a pivot end. The pivot end defines a

pivot hole (22) extending through the blade (20). A shoulder (23) formed on the pivot end of the blade (20) has a bevel shaped guiding edge (24) close to the cutting edge (21) and a driving edge (25) on the far end of cutting edge (21) perpendicular to the axis of blade (20). A pin catch (26) is formed between the cutting edge (21) and guiding edge (24).

The safety lock (30) is secured in the chamber (13) inside the handle (10) by the clamping force of the first and second halves (11, 12). In the preferred embodiment, the safety lock (30) is disposed between the blade (20) and first half (11) and has a push plate (31) adjacent to a side opening of the handle (10), where the free end of the push plate (31) forms a raised head for pushing against the pivot end of the blade (20) to move the blade (20) into an open position.

The resilient pin (40) is installed in the chamber (13) of the handle (10), wherein one end is held by the holding block (14) in the handle (10), and the other end touches the shoulder (23) of the blade (20) for supplementing the extension of the blade (20) to the open position.

The holding blocks (14) installed in the chamber (13) of the handle (10), as shown in FIGS. 2 and 3, are placed side by side at the back end or the middle section of the second half (12), forming a channel (16) for keeping the resilient pin (40) in position. Alternatively, the holding block (14) can be formed by multiple blocks inside the chamber (13) of the handle (10), as shown in FIG. 4, and arranged in two rows in alternate positions or in a one-on-one arrangement. These two rows of holding blocks (14) form a channel (161) for keeping the base of the resilient pin (40) firmly in place. In a further embodiment, the holding block (14) can be a single block inside the chamber (13) of the handle (10) (not shown in the diagrams), where the inward facing end forms a channel (161) having an inward facing opening, as opposed to the closed other end, used for keeping the base of the resilient pin (40) firmly in place.

The resilient pin (40) is fixed on the base of the handle (10) to form a gap (41), and the handle (10) has through holes (111, 121) corresponding to the position of the gap (41) for installing a stopper rod (17), as shown in FIG. 5, or rivets (171), as shown in FIG. 6, or any other equivalent means for fixing the base of the resilient pin (40) inside the handle (10). Alternatively, the first half (11) and second half (12) of the handle (10) are installed with through holes or screw holes (not shown in the diagram) corresponding to the gap (41) for receiving screws to fix the base of the resilient pin (40) inside the handle (10).

The inner walls of the resilient pin (40) and the handle (10) are designed to interlock against each other (not shown in diagram) for fixing the base of the resilient pin (40) inside the handle (10). The resilient pin (40) is fixed on one side of the base of the handle (10).

As shown in FIG. 7, the resilient pin (40) is fixed at the base of the handle (10) having a large diameter, and the pivot end of the handle (10) has a supporting pipe (19) corresponding to a back section of the channel (16), having a small diameter inner section (191) on one end and a larger diameter outer section (192) on the other end. The outer section (192) of the supporting pipe (19) corresponds with the large diameter base of the resilient pin (40) having screw threads formed on the inner wall. The inner section (191) corresponds with the outside diameter of the resilient pin (40). The resilient pin (40) is slid into the channel (16) of the handle (10) through the inner section (191) of the supporting pipe (19), and then the base (42) of the resilient pin (40) is then fixed onto the outer section (192) of the supporting pipe (19) using screws (43) for fixing the resilient pin (40) in the handle (10).

In actual operation, as shown in FIG. 8, when folding back the knife to a closed position, the blade (20) of the pocket knife is received by the handle (10). The blade (20) is pivotally moved back into the closed position in the handle (10), and the push plate (31) of the safety lock (30) is placed against the side of the blade (20). The resilient pin (40) is slightly bent and lodged on one side of the blade (20), and the free end of the safety lock (30) extends toward the guiding edge (24) of the blade shoulder (23). At the same time, the push plate (31) of the safety lock (30) is pushed against the blade (20) to offset the force of the resilient pin (40) applied on the blade (20).

When pulling out the blade (20) from the handle (10), as shown in FIGS. 9 and 10, the blade (20) is first pulled out manually to a predetermined angle, and the protruding point (27) between the guiding edge (23) and the driving edge (25) is moved to the side of the free end of the resilient pin (40), such that the force of push plate (31) of the safety lock (30) pushing against the blade (20) is lessened, and therefore the recoiling force of the resilient pin (40) acts as a supplemental driving force to extend the blade (20) from the handle (10). When the blade (20) is pivoted to the front of the handle (10), the push plate (31) of the safety lock (30) engages the driving edge (25) of the shoulder (23) on the blade (20), and the free end of the resilient pin (40) extends to the pin catch (26) of the blade (20) for moving the blade (20) into open position, such that the user can hold on to the handle (10) and use the cutting edge (21) of the blade (20). When closing the knife, the user only has to press down the push plate (31) of safety lock (30) to cause the blade (20) to be released from the shoulder (23), such that the blade (20) can then be put back pivotally into the handle (10).

In summary, the present invention provides a pocket knife with lock design having a mechanical driving aid for assisting the extension of the blade (20) into the open position semi-automatically, and a foldable design by means of a pivot joint. Furthermore, the present invention also provides a simplified knife structure that helps provide a minimum thickness of handle suitable for portability and storage.

The foregoing description of the preferred embodiments of the present invention is intended to be illustrative only and, under no circumstances, should the scope of the present invention be so restricted.

What is claimed is:

1. A pocket knife with a lock design, comprising a handle (10), a chamber (13), a blade (20), a safety lock (30), and a resilient pin (40); wherein

the handle (10) is composed of a first half (11) and a second half (12);

the chamber (13) is defined by the space between the first half (11) and the second half (12);

the blade (20) is pivotally coupled to the handle (10) by a pivot joint (15), and has a cutting edge (21), a shoulder (23) at the end of the cutting edge (21), a guiding edge (24) on the lateral side of the shoulder (23) adjacent to the cutting edge (21), a driving edge (25) on the other side far away from cutting edge (21) and perpendicular to an axis of the blade (20), and a pin catch (26) on the side wall of driving edge (25);

the safety lock (30) is secured inside the chamber (13) with one end fixed inside the handle (10), and has a push plate (31) with a raised head for engaging the shoulder (23) at the end of the blade (20) to move the blade (20) into an open position; and

the resilient pin (40) is secured in the chamber (13) of the handle (10), with one end having a gap (41) formed

therein and being fixed on the handle (**10**) and the other end being pressed against the shoulder (**23**) of the blade (**20**), the handle (**10**) having a holding block (**14**) in the chamber (**13**) displaced from the pivot joint (**15**) for holding the resilient pin (**40**) firmly in place, the resilient pin (**40**) being placed at a base of the handle (**10**), and the handle (**10**) having a through hole formed therein for holding a stopper rod (**17**) to fix a base of the resilient pin (**40**) inside the handle (**10**).

2. The pocket knife as claimed in claim **1**, wherein the holding block (**14**) in the chamber (**13**) of the handle (**10**) is formed by two long blocks juxtaposedly disposed in the handle (**10**), and a space defined between the long blocks forms a channel (**16**) for keeping the resilient pin (**40**) in position.

3. The pocket knife as claimed in claim **1**, wherein the holding block (**14**) in the chamber (**13**) of the handle (**10**) is formed by multiple blocks in two rows, alternately positioned, and a space defined between the long blocks forms a channel (**16**) for keeping the resilient pin (**40**) in position.

4. The pocket knife as claimed in claim **1**, wherein the first half (**11**) and second half (**12**) respectively have through holes (**111**, **112**) and screw holes for receiving screws to fix the base of the resilient pin (**40**) inside the handle (**10**).

5. The pocket knife as claimed in claim **2**, wherein the first half (**11**) and second half (**12**) respectively have through holes (**111**, **112**) and screw holes for receiving screws to fix the base of the resilient pin (**40**) inside the handle (**10**).

6. The pocket knife as claimed in claim **3**, wherein the first half (**11**) and second half (**12**) respectively have through holes (**111**, **112**) and screw holes for receiving screws to fix the base of the resilient pin (**40**) inside the handle (**10**).

7. The pocket knife as claimed in claim **1**, wherein the base of the resilient pin (**40**) has a large diameter portion at one end of the resilient pin, and a back end of the handle (**10**) has a supporting pipe (**19**) having a smaller diameter inner section (**191**) and a larger diameter outer section (**192**), where the outer section (**192**) of the supporting pipe (**19**) has screw threads on the inner edge matching the outer edge of the resilient pin (**40**) having a large diameter base, and the inner section (**191**) of the supporting pipe (**19**) corresponds with the outer diameter of the resilient pin (**40**), such that resilient pin (**40**) can be inserted into the handle (**10**) through the inner section (**191**) of the supporting pipe (**19**), and the base of the resilient pin (**40**) is pressed against the supporting pipe (**19**), and a screw is inserted into the outer section (**192**) of the supporting pipe (**19**) for fixing the base of the resilient pin (**40**) inside the handle (**10**).

8. The pocket knife as claimed in claim **2**, wherein the base of the resilient pin (**40**) has a large diameter portion at one end of the resilient pin, and a back end of the handle (**10**) has a supporting pipe (**19**) having a smaller diameter inner section (**191**) and a larger diameter outer section (**192**), where the outer section (**192**) of the supporting pipe (**19**) has screw threads on the inner edge matching the outer edge of the resilient pin (**40**) having a large diameter base, and the inner section (**191**) of the supporting pipe (**19**) corresponds with the outer diameter of the resilient pin (**40**), such that resilient pin (**40**) can be inserted into the handle (**10**) through the inner section (**191**) of the supporting pipe (**19**), and the base of the resilient pin (**40**) is pressed against the supporting pipe (**19**), and a screw is inserted into the outer section (**192**) of the supporting pipe (**19**) for fixing the base of the resilient pin (**40**) inside the handle (**10**).

9. The pocket knife as claimed in claim **3**, wherein the base of the resilient pin (**40**) has a large diameter portion at one end, and a back end of the handle (**10**) has a supporting pipe (**19**) having a smaller diameter inner section (**191**) and a larger diameter outer section (**192**), where the outer section (**192**) of the supporting pipe (**19**) has screw threads on the inner edge matching the outer edge of the resilient pin (**40**) having a large diameter base, and the inner section (**191**) of the supporting pipe (**19**) corresponds with the outer diameter of the resilient pin (**40**), such that resilient pin (**40**) can be inserted into the handle (**10**) through the inner section (**191**) of the supporting pipe (**19**), and the base of the resilient pin (**40**) is pressed against the supporting pipe (**19**), and a screw is inserted into the outer section (**192**) of the supporting pipe (**19**) for fixing the base of the resilient pin (**40**) inside the handle (**10**).

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